CHAPTER-9

FLOW OF CONTROL

TYPE A : VERY SHORT ANSWER QUESTIONS

1.	**What is a null statement and a compound statement? What is the alternate name for compound statement?**
Ans.	The simplest statement is a null statement i.e., just a semicolon ;. A compound statement is a sequence of statements enclosed by a pair of braces ({ }). The alternate name for compound statement is block.
2.	**What is the significance of a null statement?**
Ans.	A null statement is useful in those instances where the syntax of the language requires the presence of a statement but where the logic of the program does not.
3.	**What are the three constructs that govern statement flow?**
Ans.	The three constructs that govern statement flow are sequence, selection or iteration.
4.	**What is the significance of a test-condition in a loop?**
Ans.	The test-condition is a condition whose truth value decides whether the loop-body will be executed or not. If the test-condition evaluates to true i.e., 1, the loop-body gets executed, otherwise the loop is terminated.
5.	**What is a selection statement? Which selection statement does C++ provides?**
Ans.	The selection statement allows to choose the set-of-instructions for execution depending upon an expression's truth value. C++ provides two types of selection statements: if and switch.
6.	**Can a conditional operator replace an if statement always?**
Ans.	No in some situation conditional operator can replace if statement but not always.

7.	**Correct the following code fragment:**
	```if (x=1)```
	``` k=100;```
	``` else```
	``` k=10;```

Ans.	```if (x==1)```
	``` k=100;```
	```else```
	``` k=10;```

8.	**What will be the output of the following code fragment?**
	```:```
	```cin>>a;```
	```if(a=5)```
	``` cout<<"Five";```
	```else```
	``` cout<<"Not Five";```
	if the input given is (i)7 (ii)5?

Ans.	(i) `Five` (ii) `Five`

9.	**What will be the output of the following code fragment?**
	```int year;```
	```cin>>year;```
	```if(year%100==0)```
	``` if(year%400==0)```
	``` cout<<"LEAP";```
	``` else```
	``` cout<<"Not centaury year";```
	if the input given is (i)2000 (ii)1900 (iii) 1971?

Ans.	**(i) LEAP (ii) Not centaury year (iii) No output**

10.	**What will be the output of the following code fragment?**
	```int year;```
	```cin>>year;```
	```if(year%100==0)```
	``` { if(year%400==0)```
	``` cout<<"LEAP";```

	`}`
	`else`
	      `cout<<"Not centaury year";`
	if the input given is (i)2000 (ii)1900 (iii) 1971?

Ans.	**(i)** `LEAP` **(ii) No output** **(iii)** `Not centaury year`
11.	**In a nested-if, how does the default matching of dangling-else take place? Suggest a way to override the default dangling-else matching.**
Ans.	The default matching of dangling-else arises when in nested if statement, number of ifs is more than the number of else clauses. One method of over-riding the default dangling-else matching is to place the last occurring unmatched if in a compound statement.
12.	**Write one advantage and one disadvantage of using ?: in place of an if.**

Ans.	**Advantage:**
	  ✓ Compare to if, ?: offer more concise, clean and compact code.
	Disadvantage:
	  ✓ When ?: operator is used in its nested form, it becomes complex and difficult to understand.

13.	**What is the significance of a break statement in a switch statement? What is the effect of absence of break in a switch statement?**
Ans.	In a switch statement, when a match is found, the statement sequence associated with that case is executed until the break statement or the end of switch statement is reached. If a case statement does not include a break statement, then the control continues right on the next statement until either a break is encountered or end of switch is reached.
14.	**Write one limitation and one advantage of a switch statement.**

Ans.	**Limitation:**
	  ✓ The switch statement can only test for equality.
	Advantage:
	  ✓ The switch statement is more efficient choice in terms of code used in a situation that support the nature of switch operation.

15.	**What is "fall-through"? What is the significance of default clause in a switch statement?**
Ans.	If a case statement does not include a break statement, then the control continues right on the next statement until either a break is encountered or end of switch is reached. This situation is called fall through. The default clause statement gets executed when no match is found.
16.	**What are iteration statements? Name the iteration statements provided by C++.**
Ans.	The statements that allow a set of instructions to be performed repeatedly are iteration statements. C++ provides three iteration statements: for, while and do-while.
17.	**Which elements are needed to control a loop?**
Ans.	Following elements are needed to control a loop: 1. Initialization Expressions 2. Test Expression 3. Update Expression 4. The Body-of-the-loop
18.	**What is meant by an entry-controlled loop? Which C++ loops are entry-controlled?**
Ans.	The entry-controlled loops impose control at the time of entry into the loop by testing the test-expression before entering into a loop. the for and while loops are entry-controlled loops.
19.	**What is meant by an exit-controlled loop? Which C++ loops are exit-controlled?**
Ans.	The exit-controlled loops impose control at the time of exit from the loop by testing the test-expression before exiting from the loop. the do-while is an exit-controlled loop.

20.	**What is the output of the following code fragment?**
	    `for(int i=1;i<10;i++)`
	       `cout<<i;`

Ans.	<u>Output:</u> 123456789
21.	**What is the output of the following code fragment?** `for(int i=1;i<10;i++)`

	```cout<<i;```
Ans.	Output: 123456789

22.	**Why does "Hello" not print even once?**
	```for(i=0;i>10;i++)```
	``` cout<<"Hello";```

Ans.	As value if i is not greater than 10, the test condition is evaluates to false. So the "Hello" does not print even once.

23.	**What is the output of the following code?**
	```for(r=0;r<4;r++)```
	```{```
	``` for(c=0;c<10;c++)```
	``` cout<<"#";```
	``` cout<<"\n";```
	```}```

Ans.	Output: ########## ########## ########## ##########
24.	**Write a for loop that displays the numbers from 51 to 60.**

Ans.	```for(int i=51;i<60;i++)```
	```{```
	``` cout<<i;```
	``` cout<<"\n";```
	```}```

25.	**Which expressions are optional in a for loop? Suggest a situation where an empty loop is useful.**
Ans.	In a for loop, initialization expression, test expression and update expression are optional. An empty for loop has its applications in pointer manipulations where you need to increment or decrement pointer position without doing anything else.
26.	**An item declared in a for or while loop statement, can be accessed after the statement is over. True or false?**
Ans.	False.
27.	**What is meant by a variable's scope?**
Ans.	The program area inside which a variable can be accessed, is called variable's scope.
28.	**What is the difference between a while and do-while loop?**

While loop	**Do-while loop**
While loop is entry-controlled loop.	Do-while loop is exit-controlled loop.
The test-expression is evaluated at the beginning of the loop.	The test-expression is evaluated at the end of the loop.

Syntax:
```while(test-expression);```
```   loop-body```
	Syntax:
	```do```
	```{```
	``` statement;```
	```}while(test-expression);```

29.	**Write a while loop that displays numbers 2, 4, 6, 8, ..., 18, 20.**

Ans.	```int i=2;```
	```while(i<=20)```
	```{```
	``` if(i%2==0)```
	``` {```
	``` cout<<i;```
	``` }```
	``` i++;```
	``` cout<<"\n";```
	```}```

30.	Write a do-while loop that displays numbers 2, 4, 6, 8, ….., 18, 20.
Ans.	```int i=2;
do
{
if(i%2==0)
{
cout<<i;
}
i++;
cout<<"\n";
}while(i<=20);```
31.	Write an equivalent while loop for the following loop: ```for(int i=0, sum=0;i<=20;i=i+2)
sum+=i;```
Ans.	```int i,sum;
i=0;
sum=0;
while(i<=20)
{
sum+=i;
i=i+2;
}
cout<<"\t"<<sum;```
32.	How many times is the following loop executed? ```int s=0,i=0;
while(i++<5)
s+=i;```
Ans.	5 times.
33.	How many times is the following loop executed? ```int s=0,i=0;
do
s+=i;
while(i<5);```
Ans.	Infinite loop
34.	Name the jump statements provided by C++. Compare break and continue statements.
Ans.	C++ provides four jump statements: return, goto, break and continue. A break statement skips the rest of the loop and jumps over to the statement following the loop whereas, the continue statement skips the rest of the loop statements and causes the next iteration of the loop.
35.	The goto statement causes control to go to (a) an operator (b) a label (c) a variable (d) a function.
Ans.	(b) a label
36.	The break statement causes an exit (a) only from the innermost loop (b) only from the innermost switch (c) from all loops and switches (d) from the innermost loop or switch.
Ans.	(a) only from the innermost loop
37.	The exit() function breaks out of (a) the function it appears in (b) the loop it appears in (c) the block it appears in (d) the program it appears in.
Ans.	(d) the program it appears in.
38.	Which header file must be included in the program for using the exit() function?
Ans.	The header file process.h must be included in the program for using the exit() function.

TYPE B : SHORT ANSWER QUESTIONS

1.	**What is the problem of dangling-else? When does it arise? What is the default dangling-else matching and how it can be overridden?**
Ans.	The nested if-else statement introduces a source of potential ambiguity referred to as dangling-else problem. This problem arises when in nested if statement, number of ifs is more than the number of else clauses. One method of over-riding the default dangling-else matching is to place the last occurring unmatched if in a compound statement. In nested if statement, a dangling else statement goes with the preceding unmatched if statement. This is called default dangling-else matching. One method of over-riding the default dangling-else matching is to place the last occurring unmatched if in a compound statement.
2.	**Compare an if and a ?: operator.**
Ans.	1. Compared to if-else sequence, ?: offer more concise, clean and compact code, but it is less obvious as compared to if. 2. Another difference is that the conditional operator ?: produces an expression, and hence a single value can be assigned or incorporated into a larger expression, whereas, if is more flexible. The if statement can have multiple statements. Multiple assignments and expressions in its body. 3. When ?: operator is used in its nested form, it becomes complex and difficult to understand. This form of ?: is generally used to conceal the purpose of code.

3.	**Given the following code fragment:**
	<pre>if (a==0)
	        cout<<"Zero";
	if (a==1)
	        cout<<"One";
	if (a==2)
	        cout<<"Two";
	if (a==3)
	        cout<<"Three";</pre>**write an alternative code (using if) that saves on number of comparisons.**

Ans.	<pre>if (a==0)
	      cout<<"Zero";
	else if (a==1)
	      cout<<"One";
	else if (a==2)
	      cout<<"Two";
	else if (a==3)
	      cout<<"Three";</pre>

4.	**Given two code fragment as given below:**
	<pre>//version 1 //version 2
	do do
	{ cin>>ch; { cin>>ch;
	    if(ch>=48 && ch<=57) if(ch>=48 && ch<=57)
	        cout<<"Digit"; cout<<"Digit";
	    if(ch>=65 && ch<=90) else if(ch>=65 && ch<=90)
	        cout<<"Uppercase letter"; cout<<"Uppercase letter";
	    if(ch>=97 && ch<=122) else if(ch>=97 && ch<=122)
	        cout<<"Lowercase letter"; cout<<"Lowercase letter";
	} while(ch!='&'); } while(ch!='&');</pre>
	Discuss the advantages of version2 over version1.

Ans.	Version 1 uses three separate if statements. Thus, three times the conditions are tested whereas the version 2 usus an if-else construct. If the first condition is true in version 2, the second condition is never tested in contrast to version 1 where all conditions are always tested irrespective of whether the first condition is true or false. Therefore, the version 1 takes more processing time as compared to version 2. The version 2 is more efficient compared to version 1.

5.	**Write the syntax and purpose of a switch statement.**

Ans.	The switch statement is a multiple-branch selection statement. This selection statement successively tests the value of an expression against a list of integer or character constants. When a match is found, the statement associated with that constant are executed. The syntax of the switch statement is as follows:
	
	switch(expression)
	{
	      case constant1: statement sequence 1;
	           break;
	      case constant2: statement sequence 2;
	           break;
	      case constant3: statement sequence 3;
	           break;
	        :
	      case constant n-1: statement sequence n-1;
	           break;
	      [default: statement sequence n];
	}

6.	**Discuss when does an if statement prove more advantageous over a switch statement.**
Ans.	✓ An if statement prove more advantageous over a switch statement to evaluate a relational or logical expression i.e., multiple conditions. ✓ The if-else construction lets us use a series of expressions that may involve unrelated variables and complex expressions. ✓ The if-else statement can handle floating-point tests also apart from handling integer and character test whereas a switch cannot handle floating-point tests. ✓ The if-else can handle ranges whereas switch cannot.
7.	**Discuss when does a switch statement prove more advantageous over an if statement.**
Ans.	✓ The switch statement is more efficient that if in a situation that support the nature of switch operation. ✓ While using switch, we can optimize our code by putting the most cases first. This way unnecessary comparisons and thereby wastage of CPU time may be avoided.
8.	**Rewrite the code given in question 3 using switch.**
| **Ans.** | ```cpp
switch(a)
{
      case 0: cout<<"Zero";
            break;
      case 1: cout<<"One";
            break;
      case 2: cout<<"Two";
            break;
      case 3: cout<<"Three";
            break;
      default: cout<<"Wrong choice";
            break;
}
``` |
| 9. | **Rewrite the following code fragment using switch.**
(a) if (ch=='E')
**   eastern++;**
** if (ch=='W')**
**   wastern++;**
** if (ch=='N')**
**   northern++;**
** if (ch=='S')**
**   southern++;**
** else**
**   unknown++;**
(b) char code; |

```
        cin>>code
        if(code=='A')
            cout<<"Accountant";
        else
        if(code=='C' || code=='G')
            cout<<"Grade IV";
        else
        if (code=='F')
            cout<<"Financial Advisor";
(c) int inputnum, calcval;
        cin>>inputnum;
        If(inputnum==5)
        {
          calcval=inputnum*25-20;
          cout<<inputnum+calcval;
        }
        else
        If (inputnum==10)
        {   calcval=inputnum*25-20;
            cout<<calcval-inputnum;
        }
```

Ans.	

```
(a) switch(ch)
    {
      case 'E': eastern++;
            break;
      case 'W': wastern++;
            break;
      case 'N': northern++;
            break;
      case 'S': southern++;
            break;
      default: unknown++;
            break;
    }
(b) char code;
    cin>>code
    switch(code)
    {
      case 'A': cout<<"Accountant";
            break;
      case 'C': cout<<"Grade IV";
            break;
      case 'G': cout<<"Grade IV";
            break;
      case 'F': cout<<"Financial Advisor";
            break;
      default: cout<<"Wrong choice";
            break;
    }
(c) int inputnum, calcval;
    cin>>inputnum;
    switch(inputnum)
    {
      case 5: calcval=inputnum*25-20;
            cout<<inputnum+calcval;
            break;
      case 10: calcval=inputnum*25-20;
```

| | ```
            cout<<calcval-inputnum;
            break;
        default: cout<<"Wrong choice";
            break;
    }
``` |
| 10. | What will be the output of the following code fragment when the input is (a) 'A'  (b) 'C' (c) 'D' (d) 'F'?<br>```
cin>>ch;
switch(ch)
case 'A': cout<<"Grade A\n";
case 'B': cout<<"Grade B\n";
case 'C': cout<<"Grade C\n";
                break;
case 'D': cout<<"Grade D\n";
default: cout<<"Grade F\n";
}
``` |
| Ans. | (a) Grade A
   Grade B
   Grade C
(b) Grade C
(c) Grade D
   Grade F
(d) Grade F |
| 11. | Predict the output of following codes:<br>```
(a) if(!3)
    {
        cout<<"Tricky\n";
    }
    cout<<"Yes";
(b) if(3)
        cout<<"Tricky again";
     else
        cout<<"Am I right?";
        cout<<"No???";
(c) if(0)
    cout<<"Third time Tricky";
    cout<<"Am I right?";
(d) if(!0)
    cout<<"Fourth time again";
    cout<<"No???";
(e) if(0)
        cout<<"plz! Not again \n";
    else
        cout<<"Promise, this is the last time";
        cout<<"Thank God!";
``` |
| Ans. | ```
(a) Yes
(b) Tricky againNo???
(c) Am I right?
(d) Fourth time againNo???
(e) Promise, this is the last timeThank God!
``` |
| 12. | Predict the output of following codes:<br>```
(a) int x=3, y=6;
    if(x>=3)
        cout<<"Zip Drive"<<endl;
    if((X<=3) && (y>6))
        cout<<"Scanner"<<endl;
    if((X==3) && (y>=6))
``` |

```
            cout<<"TFT LCD Screen"<<endl;
        if((X<=3) && (y>6))
            cout<<"CD Burner"<<endl;
(b) int x=3, y=6;
    if(x>=3)
        cout<<"Zip Drive"<<endl;
    else if((X<=3) && (y>6))
        cout<<"Scanner"<<endl;
    else if((X==3) && (y>=6))
        cout<<"TFT LCD SCreen"<<endl;
    else if((X<=3) && (y>6))
        cout<<"CD Burner"<<endl;
    else
        cout<<What????";
```

Ans.	(a) Zip Drive TFT LCD Screen (b) Zip Drive
13.	**Briefly explain the working of a for loop along with its syntax. Give an example of for loop to support your answer.**

Ans.	The general-form of the for loop statement is
	      for(initialization expression(s); test-expression; update expression(s))
	          body-of-the-loop;
	Firstly, initialization expression is executed. Then, the test-expression is evaluated. If the test-expression is true, the body-of-the-loop executed. After executing the loop-body, the update expression is executed. The execution is continued until the test-expression is evaluates to false. For example,
	
	`            for(int i=1,sum=0;i<=n;++i)`
	`            {     cout<<"\n"<<i;`
	`                  sum=sum+i;`
	`            }`

14.	**Identify the possible error(s) in the following code fragment. Discuss the reason(s) of error(s) and correct the code:**
	
	`:`
	`f=1;`
	`    for(int a=40;(a);a--)`
	`f*=a;`
	`:`
	`s=0;`
	`    for(int a=1;a<40/a++)`
	`s+=a;`

Ans.	**Reasons of error:**
	1. Variable 'a' is declared twice which is invalid.
	2. There is a '/' instead of semicolon in second for loop which is invalid.
	Correct code:
	`:`
	`f=1;`
	`    for(int a=40;(a);a--)`
	`f*=a;`
	`:`
	`s=0;`
	`    for(a=1;a<40;a++)`
	`s+=a;`

15.	**Identify the possible error(s) in the following code fragment. Discuss the reason(s) of error(s) and correct the code:** **(a) cin>>i>>j;** **while(i<j)** **cout<<i*j;**

```
        i++;
(b) cin>>i>>j;
    while(i<j)
    {   cout<<i*j;
        i++;
    }
```

Ans.	(a) The while loop should be in curly braces. The correct code is as follows:

```
    cin>>i>>j;
    while(i<j)
    {
        cout<<i*j;
        i++;
    }
```

(b) This code is correct.

16.	**What is WRONG with following code fragments?**

```
(a) for(int x=0;x>0;x--)
        cout<<x;
(b) int n=7;
    do
    {
        cout<<"check this !!";
        n-=2;
    }while(n!=2);
(c) int p=8;
    do
    {
        cout<<"In the loop";
        p*=2;
    }while(p%2==0);
(d) int i=9;
    while((i<10) && (i>24))
        cout<<"Here I am - in the loop";
    i--;
(e) for(int k=2,k<=12,k++)
        cout<<k*k*k<<endl;
(f) num=4;
    while(num<10)
    {
        eggs=num*12;
        cout<<eggs;
    }
```

Ans.	(a) x is initialized with 0, and x is decremented so, the test-expression is evaluated to false every time and statement does not get executed.

(b) Increment/decrement statement is missing so it will create a infinite loop.
(c) Increment/decrement statement is missing so it will create a infinite loop.
(d) While loop should be in curly braces.
(e) There should be a ';' instead of ',' in for loop.
(f) Increment/decrement statement is missing so it will create a infinite loop.

17.	**Compare and discuss the suitability of three loops in different situations.**
Ans.	✓ The for loop is appropriate when you know in advance how many times the loop will be executed. The other two loops while and do-while loops are more suitable in the situations where it is not known before-hand when the loop will terminate. ✓ The while should be preferred when you may not want to execute the loop body even once, and the do-while loop should be preferred when you are sure you want to execute the loop body at least once. ✓ The do-while loop is a good choice when you are asking a question, whose answer will determine if the loop is to be repeated or terminated.

18.	Given the following code fragment: ```\ni=2;\nstart:\ncout<<i;\ni+=2;\nif(i<51) goto start;\n cout<<"\n Thank you";\n``` Rewrite the above code using a while loop.
Ans.	```\ni=2;\nwhile(i<51)\n{\n cout<<i;\n i+=2;\n}\ncout<<"\n Thank you";\n```
19.	Given the following code fragment: ```\ni=100;\nwhile(i)\n cout<<i--;\n cout<<"\n Thank you";\n``` Rewrite the above code using a do-while loop.
Ans.	```\ni=100;\ndo\n{\n cout<<i--;\n}while(i);\ncout<<"\n Thank you";\n```
20.	Identify the possible error(s) in the following code fragment. Discuss the reason(s) of error(s) and correct the code: ```\n:\n{\n int a,b;\n goto end;\n char ch;\n cin>>ch;\n if(ch!='\n')\n cout<<"Not a newline";\n end:\n}\n```
Ans.	A goto statement may not jump forward over a variable definition. It is possible only if the variable definition is occurring in a block and the entire block is jumped over. Following is a correct code: ```\n{\n int a,b;\n goto end;\n {\n char ch;\n cin>>ch;\n if(ch!='\n')\n cout<<"Not a newline";\n }\n end:\n}\n```
21.	What output shall be produced by following code fragments? ```\n(a) for(outer=0;outer<2;++outer)\n for(inner=0;inner<=3;++inner)\n cout<<outer<<"\t"<<inner<<endl;\n```

	(b) `for(outer=0;outer<3;++outer)`
	`    for(inner=0;inner<=5;++inner)`
	`        cout<<inner<<" ";`
	`cout<<endl;`
	(c) `for(n1=10;n1>5;--n1)`
	`    for(n2=1;n2<4;n2++)`
	`        cout<,n1<<" "<<n2<<" ";`
	`cout<<endl;`
	(d) `char outer,inner;`
	`for(outer='F';outer>='A';-outer)`
	`{`
	`    for(inner='A';inner<=outer;inner++)`
	`    {`
	`        cout<<inner;`
	`    }`
	`    cout<<endl;`
	`}`

Ans.	(a) 0 0
	    0 1
	    0 2
	    0 3
	    1 0
	    1 1
	    1 2
	    1 3
	(b) 0 1 2 3 4 5 0 1 2 3 4 5 0 1 2 3 4 5
	(c) 10 1 10 2 10 3 9 1 9 2 9 3 8 1 8 2 8 3 7 1 7 2 7 3 6 1 6 2 6 3
	(d) ABCDEF
	    ABCDE
	    ABCD
	    ABC
	    AB
	    A

22.	The following set of nested loops is not working. Can you find out, what is WRONG?
	`for(n1=1;n1<=10;++n1);`
	`{`
	`    for(n2=1;n2<=5;++n2)`
	`    {`
	`        number=n1*n2;`
	`        cout<<number<<"\n";`
	`    }`
	`}`

Ans.	n1, n2 and number variables are not declared anywhere in the above given code.

23.	**Write a for loop for the following sequence of statements without effecting the output:**
	`int Lvalue=9;`
	`cout<<Lvalue<<endl;`
	`cout<<Lvalue+1<<endl<<Lvalue-1<<endl;`
	`Lvalue=Lvalue-3;`
	`cout<<endl;`

Ans.	

24.	**What will be the outputs of following two code fragments if input is 2 5 a A Z $ q $ y $ &? Justify your answer.**
	`//version1`
	`char ch=48;          //48 in ASCII code for '0'`
	`int count=0;`
	`while(ch!='&')`
	`{    cin>>ch;`
	`     if(ch=='$')`

```
            count++;
    }
    cout<<count;
    :
    //version2
    char ch=48;
    int count=0;
    while(ch!='&')
    {    cin>>ch;
         if(ch=='$')
              count++;
    }
    cout<<count;
         :
```

Ans.	Output for Version 1:
	3
	Output for Version 2:
	3

| **25.** | **Give output of the following program:** |
| | ```
#include<iostream.h>
void main()
{
        long number=5572331,result=0;
        do
        {    result*=10;
             int digit=number%10;
             result+=digit;
             number/=10;
        } while(number);
        cout<<"Output="<<result<<endl;
}
``` |
| **Ans.** | Output: |
| | Output=1332755 |

| **26.** | **Write a short program to input a digit and print it in words.** |
| **Ans.** | ```
#include<iostream.h>
#include<conio.h>
void main()
{
    char *ones[10]={" One"," Two"," Three"," Four"," Five"," Six"," Seven","
Eight"," Nine"};
    char *seconds[10]={" Eleven"," Twelve"," Thirteen"," Fourteen","
Fifteen"," Sixteen"," Seventeen"," Eighteen"," Nineteen"};
    char *tens[10]={" Ten"," Twenty"," Thirty"," Forty"," Fifty"," Sixty","
Seventy"," Eighty"," Ninety"};
    int number,res;
    long int a,b,c,d,e;
    clrscr();
    cout << "Enter the number between 0-999 : ";
    cin >> number;
    c = (number%1000) - (number%100);
    d = (number%100) - (number%10);
    e = number%10;
    cout << "Numbers : " << c << " " << d << " " << e << endl;
    if(number==0)
    {
      cout << endl << " Zero";
    }
``` |

```
        if(c%1000 != 0)
        {
         res = c/100 -1;
         cout << ones[res] << " " << " Hundred";
        }
        if(d == 0 && e != 0)
        {
         res = e-1;
         cout << ones[res];
        }
        if(d == 10 && e != 0)
        {
         res = e-1;
         cout << seconds[res];
        }
        if((d+e)%10 == 0 && (d+e) != 0)
        {
         res = d/10 - 1;
         cout << tens[res];
        }
        if((d+e) > 20 && (d+e)%10 != 0)
        {
         res = d/10 - 1;
         cout << tens[res] << " " << ones[e-1];
        }
        cout << endl;
getch();
}
```

27.	Write a short program to check whether square root of a number is prime or not.

Ans.	<pre>void main()
	{ clrscr();
	      int n,m,f=0;
	      cout<<"Enter n: ";
	      cin>>n;
	      m=sqrt(n);
	      cout<<"\t"<<m;
	      for(int i=2;i<m/2;i++)
	      if(m%i==0)
	      {
	            f=1;
	            goto lb;
	      }
	      lb:
	      if(f==0)
	      {
	            cout<<"Prime";
	      }
	      else
	      {
	            cout<<"Not Prime";
	      }
	      getch();
	}</pre>

28.	Write a short program to print first *n* odd numbers in descending order.

Ans.	<pre>void main()
	{ clrscr();</pre>

```
          int n,m,f=0;
          cout<<"Enter n: ";
          cin>>n;
          for(int i=n;i>=0;i--)
          {
                if(i%2!=0)
                {
                      cout<<i<<endl;
                }
          }
          getch();
}
```

29.	Give the four sides of a rectangle. Write a program to find out whether its area is greater than its perimeter.
| **Ans.** | ```
void main()
{     clrscr();
      float l,b,area,peri;
      cout<<"Enter length and breadth: ";
      cin>>l>>b;
      area=l*b;
      peri=2*(l+b);
      cout<<"Area= "<<area;
      cout<<"Perimeter= "<<peri;
      if(area>peri)
      {
            cout<<"Area is greater than perimeter";
      }
      else
            cout<<"Area is not greater than perimeter";
      getch();
}
``` |
| **30.** | **Write a short program to print the following series:**
(i) 1   4   7   10 . . . . 40.
(ii) 1   -4   7   -10 . . . . . . -40. |
| **Ans.** | ```
(i) void main()
    { clrscr();
      for(int i=1;i<=40;i+=3)
      {
            cout<<"\t"<<i;
      }
      getch();
    }
(ii) void main()
     {clrscr();
      for(int i=1;i<=40;i+=3)
      {
            if(i%2!=0)
            {
                  cout<<"\t"<<i;
            }
            else
            {
                  cout<<"\t-"<<i;
            }
      }
      getch();
}
``` |
| **31.** | **Write a short program to find whether the given character is digit or a letter.** |

| Ans. | ```
void main()
{       clrscr();
        char ch;
        cout<<"Enter a character: ";
        cin>>ch;
        if(ch>=48 && ch<=57)
                cout<<"\n"<<"You entered a digit";
        else if((ch>=65 && ch<=90) || (ch>=97 && ch<=122))
                cout<<"\n"<<"You entered a letter";
        else
                cout<<"\n"<<"You entered a special character";
        getch();
}
``` |
|---|---|
| 32. | **Write a short program to convert a lowercase character to uppercase.**
(Hint: Subtracting 32 from a lowercase character gives you equivalent uppercase character e.g., 'b' – 32 will give you 'B' and 'W' – 32 will give you 'W'). |
| Ans. | ```
void main()
{       clrscr();
        char ch,ch2;
        cout<<"Enter a lowercase character: ";
        cin>>ch;
        ch2=ch-32;
        cout<<"\t"<<ch2;
        getch();
}
``` |
| 33. | **Write a short program to calculate simple interest.** |
| Ans. | ```
void main()
{       clrscr();
        float p,r,n,i;
        cout<<"Enter the principle amount: ";
        cin>>p;
        cout<<"Enter the rate of intrest: ";
        cin>>r;
        cout<<"Enter the duration: ";
        cin>>n;
        i=(p*r*n)/100;
        cout<<"Simple interest= "<<i;
        getch();
}
``` |
| 34. | **Write a short program to find average of list of numbers entered through keyboard.** |
| Ans. | ```
void main()
{
        clrscr();
        int i,a,n[10],sum=0;
        float avg=0;
        for(i=0;i<10;i++)
        {
                cout<<"Enter no."<<i<<": ";
                cin>>n[i];
                sum+=n[i];
        }
        cout<<endl<<"Sum="<<sum;
        avg=sum/10;
        cout<<"Average: "<<avg;
        getch();
}
``` |
| 35. | **Write a short program to** |

	(i) calculate area of a triangle
	(ii) find the radius of a circle whose area is given
	(iii) calculate the volume and area of a sphere (volume = $4/3\pi r^3$ and Area = $4\pi r^2$).

Ans.	<pre>(i) void main()
	       {
	              clrscr();
	              float area,a,b,c,s;
	              cout<<"Enter three sides of triangle: ";
	              cin>>a>>b>>C;
	              s=(a+b+c)/2;
	              area=sqrt(s*(s-a)*(s-b)*(s-c));
	              cout<<"Area= "<<area;
	              getch();
	       }
	(ii) void main()
	       {
	              clrscr();
	              cout<<"Enter area:";
	              double A;
	              cin>>A;
	              double r = pow(7 * A / 22, 0.5);
	              cout<<"Radius of circle is:"<<r;
	              getch();
	       }
	(iii) void main()
	       {
	              clrscr();
	              float r,v,a;
	              cout<<"Enter radius";
	              cin>>r;
	              v=(4/3)*3.14*r*r*r;
	              a=4*3.14*r*r;
	              cout<<"Volume = "<<v<<endl;
	              cout<<"Area = "<<a<<endl;
	              getch();
	       }</pre>

36.	**Write a short program to find largest number of a list of numbers entered through keyboard.**

Ans.	<pre>void main()
	{
	       clrscr();
	       int m,a[10],i;
	       for(i=0;i<10;i++)
	       {
	              cout<<"Enter no."<<i<<": ";
	              cin>>n[i];
	       }
	       m=a[10];
	       for(i=0;i<10;i++)
	       {
	              if(a[i]>m)
	              {
	                     m=a[i];
	              }
	       }
	       cout<<"Largest = "<<m;
	       getch();
	}</pre>

37.	Write a program using nested loops to produce the following designs:
	(a) A
	A B
	A B C
	A B C D
	A B C D E
	A B C D E F
	(B) & & & & & & &
	& & & & &
	& & &
	&
	(C) &
	& &
	& &
	& &
	& &
	& & & & & & & & & &

Ans.

```
(a)   void main()
      {
            clrscr();
            char ch='A';
            int n;
            cout<< "\n Enter the height of the triangle :";
            cin>> n;
            for(int i=1; i< = n ; i++)
            {
                  ch = 'A';
                  for(int j = 1; j< = i; j++)
                  {
                        cout<< ch<< " ";
                        ch++;
                  }
                  cout<< "\n";
            }
            getch();
      }

(b)   void main()
      {
            clrscr();
            int n;
            clrscr();
            cout<<"\n Enter height of a triangle :";
            cin>>n;
            for(int i = n, sp = 0; i >0 ; i --, sp++)
            {
                  for(int k=0; k<=sp; k++)
                      cout<<" "<<"     ";
                  for( int j = 1; j <  2*i ;  j++)
                  {
                        cout << "&" << "     ";
                  }
                  cout<<"\n";
            }
```

```
                    getch();
            }

(c)     void main()
        {
                clrscr();
                int n;
                cout<<"\n Enter height :";
                cin>>n;
                for(int r = 1, sp = n-1 ; r<= n ; r++, sp--)
                {
                        for (int k = 0; k<=sp ; k++)
                            cout<< "       " ;
                        for(int c = 1; c < 2*r ; c++)
                        {
                                if(c==1 || c == 2*r - 1 || r == n )
                                  cout << "   & ";
                                else
                                  cout<< "        " ;
                        }
                cout<< endl;
                }
                getch();
        }
```

38.	Write a program using nested loops to produce a rectangle of *'s with 6 rows and 20 *'s per row.
| Ans. | ```
void main()
{
      clrscr();
      int r,y;
      for(int i=1;i<=6;i++)
      {
              for(int j=1;j<=20;j++)
              {
                      cout<<"*";
              }
              cout<<endl;
      }
      getch();
}
``` |

TYPE C : LONG ANSWER QUESTIONS

1.	Given three numbers A, B, and C, write a program to write their values in an ascending order. For example, if A=12, B=10 and C=15, your program should print out: Smallest number = 10 Next highest number = 12 Highest number = 15
| Ans. | ```
void main()
{
      clrscr();
      float a,b,c,small,mid,high;
      cout<<"Enter three no. : ";
      cin>>a>>b>>c;
      small=a;
      if(b<small)
            small=b;
      if(c<small)
            small=c;
``` |

```
        if(a==small)
        {     if(b<c)
              {     mid=b;
                    high=c;
              }
              else
              {     mid=c;
                    high=b;
              }
        }
        else if(b==small)
        {     if(a<c)
              {
                    mid=a;
                    high=c;
              }
              else
              {     mid=c;
                    high=a;
              }
        }
        else if(c==small)
        {     if(a<b)
              {     mid=a;
                    high=b;
              }
              else
              {
                    mid=b;
                    high=a;
              }
        }
        cout<<"Smallest number = "<<small<<endl;
        cout<<"Next highest number = "<<mid<<endl;
        cout<<"Highest number = "<<high<<endl;
        getch();
}
```

2.	A bank accepts fixed deposits for one year or more and the policy it adopts on interest is as follows:
	(i) If a deposit is less than Rs. 2000 and for 2 or more years, the interest rate is 5 percent compound annually.
	(ii) If a deposit is less than Rs. 2000 or more but less than 6000 and for 2 or more years, the interest rate is 7 percent compound annually.
	(iii) If a deposit is more than Rs. 6000 and is for 1 year or more, the interest is 8 percent compound annually.
	(iv) On all deposit for 5 years or more, interest is 10 percent compound annually.
	(v) On all other deposits not covered by above conditions, the interest is 3 percent compounded annually.
	Given the amount deposited and the number of years, write a program to calculate the money in the customer's account at the end of the specified time.
| **Ans.** | ```
void main()
{
        clrscr();
        int r,y;
        float depo,tot_amt;
        cout<<"Enter deposite : ";
        cin>>depo;
        cout<<"Enter year : ";
        cin>>y;
        if(depo<2000 && y>=2)
                r=5;
``` |

```
            else if(depo>=2000 && depo<6000 && y>=2)
                    r=7;
            else if(depo>6000 && y>=1)
                    r=8;
            else if (y>=5)
                    r=10;
            else
                    r=3;
            tot_amt=depo+((depo*r)/100);
            cout<<"Total amount is: "<<tot_amt;
            getch();
    }
```

3.	Write a complete C++ program to do the following: **(i) read an integer X** **(ii) from an integer Y by reversing the digits of X and integer S having sum of digits of X** **(iii) output Y and S** **(For example, if X is equal to 5076, then Y should be equal to 6705 and S should be 18)**

Ans.	<pre>void main()
	{
	        int X, Y = 0, S = 0;
	        int r = 0;
	        cout<< "\n Enter an integer :";
	        cin >> X;
	        for(int i = X; i>0 ; i = i /10)
	        {
	            r = i % 10;
	            S =S+r;
	            Y = Y*10 + r;
	        }
	        cout << "\n The reverse of " << X << " is " << Y;
	        cout<< "\n The Sum of the digits = " << S;
	        getch();
	}</pre>

4.	Write a program to find the LCM and GCD of two numbers.

Ans.	<pre>void main()
	{
	        clrscr();
	        int x,y,gcd=1;
	        cout<<"ENTER 1st NO : ";
	        cin>>x;
	        cout<<"\n\nEnter 2nd NO. :";
	        cin>>y;
	        for(int i=1;i<1000;++i)
	        {
	            if((x%i==0)&&(y%i==0))
	            gcd=i;
	        }
	        cout<<"\n\n\nGCD :"<<gcd;
	        cout<<"\n\n\nLCM :"<<(x*y)/gcd;
	        getch();
	}</pre>

5.	Write a program to print the truth table for XY + Z.

Ans.	<pre>void main()
	{
	        clrscr();
	        cout<< "Truth Table\n";
	        cout<< "X\t Y\t Z\t\t XY+Z \n\n";</pre>

```
                    for(int i = 0 ; i<=1 ; i++)
                      for(int j = 0; j<=1; j++)
                        for(int k = 0; k<=1; k++)
                        {
                            cout<< i<< "\t"<< j << "\t" << k << "\t\t";
                            if( (i == 1 && j == 1) || k == 1)
                                cout<< 0;
                            else
                                cout<< 1;
                                cout<<"\n";
                        }
                    getch();
    }
```

6.	Write a C++ program to print Fibonacci series (upto 10 terms). [A fibonacci series is the one in which every term (third term onwards) is sum of previous two terms. 0 1 1 2 3 5 . . . is a Fibonacci series).
Ans.	<pre>void main()
{
clrscr();
int f=0,s=1,t;
cout<<f<<" "<<s<<" ";
for(int i=3;i<=10;i++)
{
t=f+s;
cout<<t<<" ";
f=s;
s=t;
}
getch();
}</pre>
7.	Given a list of integers, write a program to find those which are palindromes. For example, the number 4321234 is a palindrome as it reads the same from left to right and from right to left.
Ans.	<pre>void main()
{
clrscr();
char str[100];
cout << "Enter no.:";
cin >> str;
int x = strlen(str)-1;
for(int i = 0; i <= x; i++)
{
if (str[i] == str[x-i])
{
continue;
}
else
{
cout<<"Not a palidrome" << endl;
exit(0);
}
}
cout << "Yes Entered no. is a palidrome"<< endl;
getch();
}</pre>
8.	Write a complete C++ program to do the following: (i) read an integer X. (ii) determine the number of digits *n* in X. (iii) form an integer Y that has the number of digits *n* at ten's place and the most significant digit of X at one's

	place. **(iv) Output Y.** **(For example, if X is equal to 2134, then Y should be 42 as there are 4 digits and the most significant number is 2).**
| **Ans.** | ```cpp
void main()
{
    clrscr();
    int X, Y = 0, n = 0;
    int r = 0;
    cout<< "\n Enter an integer :";
    cin >> X;
    for(int i = X; i>0 ; i = i /10)
    {
        r = i % 10;
        n++;
    }
    Y = n * 10 + r;
    cout << "\n The given number  is " << X ;
    cout<< "\n The new required number is = " << Y;
    getch();
}
``` |
| **9.** | **Write a C++ program print every integer between 1 and n divisible by m. also report whether the number that is divisible by m is even or odd.** |
| **Ans.** | ```cpp
void main()
{
    clrscr();
    int n, m;
     cout<< "\n Enter the value of n :";
    cin >> n;
    cout<< "\n Enter the value of m :";
    cin >> m;
    if(m>n)
    {    cout<< "\n The number " << n << "  is not divisible by "  << m;
        getch();
        exit(1);
    }
    for( int  i = n ; i > = m ; i-- )
    {
        if(i % m == 0)
        {
            cout << "\n " << i << "  is divisible by " << m;
            if(i%2 == 0)
                cout<< "\n The number " << i << "Even";
            else
                cout<< "\n The number " << i << "Odd";
        }
    }
        getch();

}
``` |
| **10.** | **Write C++ program to sum the given sequences:**
(a) $\frac{2}{9} - \frac{5}{13} + \frac{8}{17} \ldots \ldots$ **(b)** $1^2 + 3^2 + 5^2 + \ldots + n^2$ |
| **Ans.** | ```cpp
(a) #include<iostream.h>
    #include<conio.h>
    #include<math.h>
    void main()
    {
``` |

```cpp
        int i,n,sign=1;
        float a=2,b=9;
        clrscr();
        cout<<"Enter the number of terms in the series: ";
        cin>>n;
        float sum = a/b;
        for(i=1;i<n;i++)
        {
           a=a+3;
           b=b+4;
           sign= -1*sign;
           sum+=sign*(a/b);
        }
        cout<<"\nThe sum of the series is = "<<sum;
        getch();
}

(b) void main()
    {
            clrscr();
            float n,sum=0;
            clrscr();
            cout<<"Enter n: ";
            cin>>n;
            for(int i=1;i<=n;i++)
            {
                    if(i%2==1)
                    {
                            sum=sum+(i*i);
                            cout<<i*i<<"\t";
                    }
            }
            cout<<endl<<"Sum= "<<sum;
            getch();
    }
```

11.	Write C++ program to sum the sequence $$1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots \ldots$$

| Ans. | ```cpp
void main()
{
        clrscr();
        float n,a,s,sum=0,fact=1;
        clrscr();
        cout<<"Enter n: ";
        cin>>n;
        for(int i=1;i<=n;i++)
        {
                fact=fact*i;
                sum+=1/fact;
                cout<<"\t"<<fact;
        }
        cout<<endl<<"Sum= "<<1+sum;
        getch();
}
``` |
|---|---|

12.	Write a program to accept the age of n employees and count the number of persons in the following are group: (i) 26 – 35 (ii) 36 – 45 (iii) 46 - 55

| Ans. | ```cpp
void main()
{
``` |
|---|---|

```
            clrscr();
            int a[20];
            int n,m,age;
            int c1=0,c2=0,c3=0;
            cout<<"Enter how many employees : ";
            cin>>n;

            for(int i=1;i<=n;i++)
            {
                    cout<<"Enter age"<<i<<": ";
                    cin>>a[i];
            }
            m=a[20];
            for(i=1;i<=n;i++)
            {
            if(a[i]>=26 && a[i]<=35)
                    c1++;
            else if(a[i]>=36 && a[i]<=45)
                    c2++;
            else if(a[i]>=46 && a[i]<=55)
                    c3++;
            }
            cout<<"Number of employees between age 26 - 35 years are: "<<c1<<endl;
            cout<<"Number of employees between age 36 - 45 years are: "<<c2<<endl;
            cout<<"Number of employees between age 46 - 55 years are: "<<c3<<endl;
            getch();
}
```

13.	**Write a program to find the sum of the following series:** **(a)** $x - \frac{x2}{2!} + \frac{x3}{3!} + \frac{x4}{4!} + \frac{x5}{5!} - \frac{x6}{6!}$ **(b)** $X + \frac{x2}{2} + \frac{x3}{3} + \text{.......} + \frac{xn}{n}$

Ans.	(a) Student solve this
	
	(b) `#include<iostream.h>`
	   `#include<conio.h>`
	   `#include<math.h>`
	   `void main()`
	   `{`
	   `  int series=0;`
	   `  int i,n,x;`
	   `  clrscr();`
	   `  cout<<"ENTER THE VALUE OF N :";`
	   `  cin>>n;`
	   `  cout<<"\n ENTER THE VALUE OF X :";`
	   `  cin>>x;`
	   `  for(i=1;i<=n+1;i++)`
	   `  {`
	   `    series+=(pow(x,i)/i);`
	   `    cout<<pow(x,i)<<endl;`
	   `  }`
	   `  if(n==0)`
	   `    cout<<"\n Series = 0 ";`
	   `  else`
	   `    cout<<"\n Series = "<<series;`
	   `getch();`
	   `}`

14.	**Write a program to find sum of the series** $S = 1 + x + x^2 + \text{......} + x^n.$

| Ans. | ```cpp
#include<iostream.h>
#include<conio.h>
#include<math.h>
void main()
{
int sum=0,x=0,n=0;
clrscr();
cout<<"Enter value for x :";
cin>>x;
cout<<"Enter value for n :";
cin>>n;
for(int i=0;i<=n;i++)
    {
    sum = sum + pow(x,i);
    cout<<pow(x,i);
    }
cout<<"Sum is:" << sum;
getch();
}
``` |
|---|---|