

## Header files identification

1. Name the header files to which the following belong:  
(i) puts()           (ii) isalnum()
1. (i) stdio.h       (ii) ctype.h
2. Write the name of the header files to which the following belong:  
(i) strcat()       (ii) atoi()
2. (i) string.h      (ii) string.h
3. Name the header files in which the following belong:  
(i) pow()           (ii) random()
3. (i) math.h       (ii) stdlib.h
4. Name the header files in which the following belong:  
(i) gets()           (ii) open()
4. (i) stdio.h       (ii) fstream.h
5. Name the header file(s) that shall be needed for successful compilation of the following C++ code:  
    void main() {  
        char string[20];  
        gets(String);  
        strcat(String, "CBSE");  
        puts(String);  
    }
5. The header files are : stdio.h, string.h
6. Name the header files that shall be needed for the following code:  
    void main() {  
        char word[] = "Exam";  
        cout<<setw(20)<<word;  
    }
6. The required header files are : iomanip.h and iostream.h
7. What is cascading?
7. The multiple uses of input or output operators in one statement are called cascading of I/O operators.
8. What is the purpose of default clause in a switch statement?
8. The default statement gives the switch construct away to take action if the value of the switch variable does not match any of the case constant.
9. What are the applications of void data type in C++?

9. The void type specifies an empty set of values. It is used as the return type for function that do not return any value. No object of void type may be declared because it depicts a nil parameter list for a function.
10. What is the effect of absence of break in switch-case statement?
10. In **switch-case** statement, when a match is found, the statement sequence associated with that case is executed until a break statement or the end of **switch** statement is reached. So if break statement is missing, then the statement sequence is executed until the end of the switch-case statement is reached.
11. Give the output of the following program segment:  

```
int I = 200, j = 18;
cout << i/j << endl;
```
11. 11
12. When will you make a function inline?
12. When the size of the code of a function is small that the overhead of the function call becomes prominent then the function should be declared as inline.
13. What is the significance of any empty parentheses in a function declared?
13. void message() function declare with an empty parentheses, in means that the function does not pass any parameters.
14. How are abstraction and encapsulation inter-related?
14. Encapsulation means wrapping up of data and functions which operate the data into a single unit and ensures only essential features get represented without representing the detail background. i.e., called Abstraction. Therefore, both are inter-related.
15. Write the declaration of inline function named bar() that takes one argument of type float and return type int.
15. 

```
inline int bar(float a);
{
    .....
}
```
16. Observe the following C++ and write the name(s) of the header file(s), which will be essentially required to run it in a C++ compiler.
- ```
void main()
{
    float Area, Side;
    cin >> Area;
    Side = sqrt (Area);
    cout << "One Side of the Square=" << Side << endl ;
}
```

16. `#include<iostream.h>`  
`#include<math.h>`
17. Observe the following C++ code and write the name(s) of the header file(s), which will be essentially required to run it in a C++ compiler.
- ```
void main ()
{
  Int Number;
  cin>>Number;
  if (abs (Number) == Number);
      cout<< "Positive"<<endl;
}
```
17. `#include<iostream.h>`  
`#include<maths.h>`
18. Name the header file(s), which are essentially required to run the following program segment.
- ```
void main ()
{
  char A= 'K',B;
  if (islower (A) )
  B=toupper (A);
  else
      B= '*';
  cout<<A>> "turned to" <<B<<endl;
}
```
18. `#include<iostream.h>`  
`#include<maths.h>`  
`#include<ctype.h>`
19. Write the names of the headers files to which the following belong:  
 (i) `puts ( )`      (ii) `sin ( )`
19. `puts ( )` → `<stdio.h>`  
`Sin ( )` → `<math.h>`
20. Write the name of the header file to which the following belong:  
 (i) `puts ( )`      (ii) `randomize ( )`
20. `setw ( )` → `<iomanip.h>`  
`Sqrt ( )` → `<math.h>`
21. Observe the following C++ code and write the name(s) of the header file (s), which will be essentially required to run in a C++ compiler.
- ```
void main ( )
{
  char Text[20],c;
```

```

    cin>>Text;
    C=tolower (Text[0]);
    cout<<C<< "is the first char of"<<Text<<endl;
}

```

21. cout, cin → #include<iostream.h>  
 Toupper( ) → #include<ctype.h>

22. Observe the following C++ code and write the name(s) of the header file (s), which will be essentially required to run in a C++ compiler.

```

void main ( )
{
    char CH, STR[20];
    cin>>STR;
    CH=toupper(STR[0]);
    cout<<STR<< "starts with" <<CH<<endl;
}

```

22. cin, cout → #include<iostream.h>  
 toupper( ) → #include<ctype.h>

23. Which C++ header files(s) are essentially required to be included to run/execute the following C++ source code?

```

void main ( )
{
    char STRING[ ]="Something";
    cout<<"Balance Characters :"<<160-
    strlen (STRING)<<CH<<endl;
}

```

(Note Do not include any header file, which is /are not required).

23. #include<iostream.h>→cout  
 #include<string.h>→strlen( )

24. Which C++ header file(s) are essentially required to be include to run/execute the following C++ source code?

```

void main ( )
{
    char Text[ ]="SomeThing";
    cout<< "Remaining SMS Chars:"<< "160-
    strlen (STRING) <<endl;
}

```

(Note Do not include any header file, which is /are not required).

Ans 24. #include<iostream.h>→cout  
 #include<string.h>→strlen( )

25. Write the names of the header files, which is/are essentially required to run, execute the following C++ code.

```

void main ( )
{

```

```

char C, string[ ]= "Excellence Overload";
for (int I=0; string[ I ] != '\0';I++)
if(string[ I ]== ' ')
cout<<endl;
else
{
    C=toupper (Text[ I ] ) ;
    cout<<C;
}
}

```

25. #include<iostream.h>→cout  
#include<ctype.h>→toupper ( )

26. Write the names of the header files, which is/are essentially required to run/execute the following C++ code.

```

void main ( )
{
    char CH, Text[ ]= "+ve Altitude";
    for (int I =0; Text [ I ] != '\0';I++)
    if(Text[ I ]== 1 )
    cout<<endl;
    else
    {
        CH = toupper (Text[ I ] ) ;
        cout<<CH;
    }
}

```

26. #include<ctype.h>→toupper( )  
#include<iostream.h>→cout

27. Which C++ header file(s) will be essentially required to be included to run/execute the following C++ code?

```

void main ( )
{
    Int Rno=24;
    char Name[ ]= "Aman Singhania";
    cout<<setw(10)<<Rno<<setw(20)
    <<Name<<endl;
}

```

27. #include<iomanip.h>→setw( )  
#include<iostream.h>→cout

28. Name the header files that shall be needed for the following code

```

void main ( )
{
    char Text[ ]= "computers";
    cout<<setw(15)<<Text;
}

```

28. #include<iostream.h>→cout  
#include<iomanip.h>→setw( )

29. Name the header files that are essential to run the following code segment successfully

```

void main()
{ char ch[10];
  cout<<"enter ur name \n";  cin.getline(ch,10);
int l=strlen(ch);
  cout.write(ch,l);
}

```

29. iosstream.h and ctype.h

30. Find the correct identifiers out of the following, which can be used for naming

variable, constants or functions in a C++ program :  
While, for, Float, new, 2ndName, A%B, Amount2, \_Counter

30. While, Float, Amount2, \_Counter

31. Find the correct identifiers out of the following, which can be used for naming Variable, Constants or Functions in a C++ program :

For, while, INT, NeW, delete, 1stName, Add+Subtract, name1

31. For, INT, NeW, name1

32. Name the header files that are essential to run the following code segment successfully

```

void main()
{
  int r;
  float A,B;
  cout<<"enter the radius of circle\n";
  cin>>r;
  A=3.14*pow(r,2);
  B=32767;
  cout<<"area =\t"<<A<<endl;
  cout<<B;
}

```

32. iosstream.h and math.h

33. Which of the following are valid identifiers?

Data\_rec Data rec, 1 data, data 1, my.file, asm, switch, goto

33. Data\_rec asm
34. What is the result of following expression?  $Y = (t=4, t+3);$   
34. 7
38. Write the names of the headers files to which the following belong:  
randomize( ), getch( )  
38. stdlib.h , conio.h
39. Write the names of the headers files to which the following belong:  
fabs( ), atoi( )  
39. math.h, stdlib.h
40. Observe the following program very carefully and write the names of those header file(s), which are essentially needed to compile and execute the following program successfully:
- ```

typedef char TEXT[80];
void main()
{
TEXT Str[] = "Peace is supreme";
int Index=0;
while (Str[Index]!='\0')
if (isupper(Str[Index]))
Str[Index++]='#';
else
Str[Index++]='*';
puts(str);
}

```
40. ctype, stdio

## ERROR RELATED QUESTIONS

34. Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined.  
Note: Assume all required header files are already being included in the program.

```

#Define float Max=70.0;
Void main()
{
int Speed
char Stop='N' ;
cin>>Speed;
if Speed>Max
Stop='Y' ;
cout<<Stop<<end;

```

```

}
Ans #define Max 70.0 //Error 1,2,3
void main() //Error 4
{
int Speed ; //Error 5
char Stop='N' ;
cin>>Speed;
if (Speed>Max) //Error 6
Stop='Y' ;
cout<<Stop<< endl ; //Error 7
}

```

35.

Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined.  
 Note: Assume all required header files are already being included in the program.

```

const Max=70.0;
void main[]
{
int Speed;
char Stop='N' ;
cin<<Speed;
if (Speed>Max)
Stop='Y' ;
cout<<Stop<<endl;
}

```

Ans .

```

const float Max=70.0; //error1
void main()() // error2
{
int Speed;
char Stop='N';
cin>>Speed; // error3
    if (Speed>Max)
        Stop='Y';
cout<<Stop<<endl; // error4
}

```

36.

Rewrite the following program after removing the syntactical error(s) if any. Underline each correction.

```

#include<iostream.h>
void main( )
{ First = 10, Second = 20;
Jumpto(First;Second);
Jumpto(Second);
}

```



```

void Jumpto(int N1, int N2 = 20)
{ N1=N1+N2;
  count<<N1>>N2;
}

```

Ans #include<iostream.h>

```

void main( )
{ void Jumpto(int, int x=20); // prototype missing with default value
  int First = 10, Second = 20; //data type missing
  Jumpto(First, Second); //comma instead of ;
  Jumpto(Second);
}
void Jumpto(int N1, int N2) // default value redeclared
{ N1=N1+N2;
cout<<N1<<N2; // cout and << operator required
}

```

37.

Rewrite the following program after removing the syntactical error(s) if any. Underline each correction.

```

#include<iostream.h>
const int Max 10;
void main()
{ int Numbers[Max];
  Numbers = {20,50,10,30,40};
  for(Loc=Max-1;Loc>=10;Loc--)
  cout>>Numbers[Loc];
}

```

Ans

```

#include<iostream.h>
const int Max=10; // constant must be initialized
void main()
{ int Numbers[Max]= {20,50,10,30,40}; // expression syntax error
  for(int Loc=Max-1;Loc>=10;Loc--) // Loc to be declared
  cout<<Numbers[Loc]; // << operator required instead of >>
}

```

38.

Rewrite the following program after removing the syntactical error(s), if any. Underline each correction.

```

#include<iostream.h>
void main( )
{
  struct movie
  { char movie_name[20];
    char movie_type;
    int ticket_cost=100;
  }M;
}

```

```

gets(movie_name);
gets(movie_type);
}
Ans #include<iostream.h>
#include<stdio.h> // error1
void main()
{ struct movie
  { char movie_name[20];
  char movie_type;
  int ticket_cost; // error2
  }M;
gets(M.movie_name); // error3
cin>>(M.movie_type); // error4
}

```

39.

Rewrite the following program after removing all the syntax error(s), if any.

```

#include<iostream.h>
void main(){
int X[]={60, 50, 30, 40},Y;Count=4;
cin>>Y;
for(I=Count-1;I>=0,I--)
switch(I)
{ case 0:
case 2:cout<<Y*X[I]<<endl;break;
case1:
case 3:cout>>Y+X[I];
}}

```

**Ans**

```

#include<iostream.h>
void main()
{
int X[]={60, 50, 30, 40},Y,Count=4; // error 1
cin>>Y;
for(int I=Count-1;I>=0;I--) // error 2,3
switch(I)
{ case 0:
case 2:cout<<Y*X[I]<<endl;break;
case 1: // error 4
case 3:cout<<(Y+X[I]);break; // error 5
}
}

```

40.

Rewrite the following program after removing all the syntax error(s), if any.

```

#include<iostream.h>
void main(){
int P[]={90, 10, 24, 15},Q;Number=4;
Q=9;
for(int I=Number-1;I>=0,I--)
switch(I)
{ case 0:
case 2:cout>>P[I]*Q<<endl;

```

```
break;
case 1 :
case 3:cout<<P[I]+Q;
}
```

```
Ans #include<iostream.h>
void main(){
int P[]={90, 10, 24, 15},Q,Number=4; //error 1
Q=9;
for(int I=Number-1;I>=0;I--) // error 2
switch(I)
{
case 0:
case 1 : // error 3
case 2:cout<<P[I]*Q<<endl; // error 4
break;

case 3:cout<<(P[I]+Q) ;
}
} //error 5
```

41.

Rewrite the following program after removing all the syntactical error(s), if any.

Underline each correction.

```
#include<iostream.h>
void main(){
Present=25,Past=35;
Assign(Present;Past);
Assign(Past);
}
void Assign(int Default1,Default2=30)
{
Default1=Default1+Default2;
cout<<Default1>>Default2;
}
```

```
Ans #include<iostream.h>
void Assign(int Default1,int Default2=30);
void main()
{
int Present=25,Past=35;
Assign(Present,Past);
Assign(Past);

}
void Assign(int Default1,int Default2)
{
Default1=Default1+Default2;
cout<<Default1<<Default2;
}
```

42.

Rewrite the following program after removing all the syntactical error(s), if any. Underline each correction.

```

#include<iostream.h>
void main(){
One=10,Two=20;
Callme(One;Two);
Callme(Two);
}
void Callme(int Arg1,int Arg2=20)
{
Arg1=Arg1+Arg2
cout<<Arg1>>Arg2;
}
Ans #include<iostream.h>
void Callme (int Arg1,int Arg2=20);
void main(){
int One=10,Two=20;
Callme(One;Two);
Callme(Two);
}
void Callme( int Arg1,int Arg2)
{
Arg1=Arg1+Arg2;
cout<<Arg1<<Arg2;
}

```

43.

Rewrite the following program after removing all the syntactical error(s), if any. Underline each correction.

```

#include<iostream.h>
typedef char[80];
void main(){
String S="Peace";
int L=strlen(S);
cout<<S<<'has'<<L<<'characters'<<endl;
}

```

```

Ans #include<iostream.h>
#include<string.h>
typedef char String[80];
void main(){
String S="Peace";
int L=strlen(S);
cout<<S<<"has"<<L<<"characters"<<endl;
}

```

44.

What are programming paradigms? Give names of some popular programming paradigms.

**Ans .**

Programming Paradigm: A Programming Paradigm defines the methodology of designing and implementing programs using the key features and building blocks of a programming language. Following are the different programming paradigms:

- (i) Procedural Programming
- (ii) Object Based Programming
- (iii) Object Oriented Programming

**45. Reusability of classes is one of the major properties of OOP. How is it implemented in C++?**

**Ans**

Reusability of classes is implemented through inheritance in C++. Inheritance is implemented by specifying the name of the (base) class from which the class being defined (the derived class) has to inherit from.

It is done with the following syntax:

```
class<derived class name> : <base class name>
{
  <- derived class own features.
}
```

**45. Write a short note on OO programming.**

**Ans** OOP stands for Object Oriented Programming. In, Object-Oriented Programming (OOP), the program is organized around the data being operated upon rather than the operations performed. The basic idea behind OOP is to combine both, data and its functions that operate on the data into a single unit called object.

Following are the basic OOP concepts:

1. Data Abstraction
2. Data Encapsulation
3. Modularity
4. Inheritance
5. Polymorphism

**46.**

Rewrite the following program after removing the syntactical errors (if any). Underline each correction.

```
#include[iostream.h]
typedef char Text(80) ;
void main ( )
{
  Text T= "Indian";
  int Count=strlen(T) ;
  cout<<T<<'has'<<Count<<'characters'<<end1;
}
```

**Ans** #include<iostream.h>

```
#include<string.h>
typedef char Text [80];
void main ( )
{
  Text T= "Indian";
```

```

int Count=str1en(T);
cout<<T<< "has" <<Count<< "cbaracters"<<endl;
}

```

47. Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined.  
 Note: Assume all required header files are already being included in the program.

```

typedef char[50] STRING
void main()
{
    City STRING;
    gets(City);
    cout<<City[0]<<'\t,<<City[2];
    cout<<City<<endl;
}

```

Ans

```

typedef char STRING[50]; // error 1
void main()
{
    STRING City; // error 2
    gets(City);
    cout<<City[0]<<'\t'<<City[2]; // error 3
    cout<<City<<endl; // error 4
}

```

## RANDOM FUNCTIONS

48. Study the following program and select the possible output(s) from the option (i) to (iv) following it. Also write the maximum and the minimum values that can be assigned to the variable NUM.  
 Note: - Assume all required header files are already being included in the program.

- random(n) function generates an integer between 0 and n-1.

```

void main()
{
    randomize();
    int NUM;
    NUM=random(3)+2;
    char TEXT[]="ABCDEFGHJK";
    for (int I=1;I<=NUM; I++)
    {
        for (int J=NUM;J<=7;J++)

```

```

cout<<TEXT[J];
cout<<endl;
}
}
(i) FGHI      (ii) BCDEFGH      (iii) EFGH      (iv) CDEFGH
    FGHI      BCDEFGH      EFGH      CDEFGH
    FGHI      EFGH
    FGHI      EFGH

```

Ans (iii) and (iv)

Minimum value of NUM = 2 and Maximum value of NUM = 4

49.

Go through the C++ code shown below, and find out the possible output or outputs from the suggested Output Options (i) to (iv). Also, write the least value and highest value, which can be assigned to the variable Guess.

```

#include<iostream.h>
#include<stdlib.h>
void main ( )
{
randomize ( ) ; int Guess, High=4; Guess=random(High)+ 50 ;
for(int C=Guess ; C<=55 ; C++)
cout<<C<<"#" ; }

```

i) 50 # 51 # 52 # 53 # 54 # 55 #

(ii) 52 # 53 # 54 # 55

(iii) 53 # 54 #

(iv) 51 # 52 # 53 # 54 # 5568.

Ans (i) 50 # 51 # 52 # 53 # 54 # 55 #

Least value 50

Highest value 53

50. Go through the C++ code shown below, and find out the possible output or outputs from the suggested Output Options (i) to (iv). Also find out the minimum and maximum value that can be assigned to Guess at the time when value of Turn is 3.

```

#include<iostream.h>
#include<stdlib.h>
void main()
{
    char Result[][10]={"GOLD","SILVER","BRONZE"};
int Gt=9,Guess;
for(int Turn=1;Turn<4;Turn++)
{

```

```

Guess=random(Turn);
cout<<(Gt-Guess)<<Result[Guess]<<"*";
}
}

```

- (i) 9GOLD\*9GOLD\*8SILVER\*
- (ii) 9GOLD\*7BRONZE\*8GOLD\*
- (iii) 9GOLD\*8SILVER\*9GOLD\*
- (iv) 9GOLD\*8SILVER\*8GOLD\*

**Ans** Correct answer is 9GOLD\*9GOLD\*8SILVER\*  
Minimum value of Guess is 0 and Maximum is 2

51. Observe the code carefully and find which output(s) will be expected from the program? and justify your answer:

```

#include <iostream.h>
#include <stdlib.h>
const int K=2;
void main()
{  randomize();
    int A;
    A=random(K)+2;
    for(int i=A;i<3;i++)
    cout<<i<<" ";
    cout<<endl;

```

- (i) 1,2,
- (ii) 0,1,2
- (iii) 2,
- (iv) 0,1,2,

**Ans** (iii) 2,  
Minimum value of A is 2 and Maximum is 3

52. Observe the code carefully and find which output(s) will be expected from the program?  
Justify your answer:

```

#include <iostream.h>
#include <stdlib.h>
void main()
{  randomize(); int A; A=2+random(3);
    for(int i=A;i<5;i++)
    cout<<'# '<<i;

```

- (i) #1#2#3
- (ii) #2#3#4
- (iii) #4#3#2
- (iv) None of these

**Ans** (ii) #2#3#4 because Minimum value of A=2 and Maximum is 4 and i is increasing (i++)



53.

Observe the code carefully and find which output(s) will not be expected from the program?

Justify your answer:

```
#include <iostream.h>
#include <stdlib.h>
const int K=4;
void main()
{  randomize();
   int A;
   A=2+random(K);
   for(int i=0;i<A;i++)
   cout<<i<<",";
}
```

- (i) 0,1,      (ii) 0,1,2,      (iii) 0,2,4,      (iv) 0,1,2,3,4,5,

**Ans** (iii) 0,2,4, because minimum value of A=2 and Maximum value is 5

54.

Observe the code carefully and select most possible answer from the choices given below and justify your answer:

```
#include <iostream.h>
#include <stdlib.h>
#define K 4
void main()
{  randomize();
   int A;
   A=20+random(K);
   for(int i=A;i>=20;i--)
   cout<<i<<"^";
   cout<<endl;
}
```

- (i)  $22^{21}20^{19}$       (ii)  $24^{23}22^{21}20^{\wedge}$   
(iii)  $20^{21}22^{\wedge}$       (iv)  $20^{\wedge}$

**Ans** (iv)  $20^{\wedge}$  because Minimum value of A=20 and Maximum value is 23

55. Observe the following code carefully, if the value of num entered by user is 4, choose the correct

possible output(s) from the options from (i) to (iv) and justify your option.

```
#include<iostream.h>
```



- (i) 100#
- (ii) 50#200#
- (iii) 100#50#200#
- (iv) 100#50

**Ans (iii)** 100#50#200# because minimum value of Tanker is 2 and Maximum value is 3

## OUTPUT QUESTIONS

### 3 marks Questions

1. Write the output of the following C++ program code:  
Note: Assume all the required header files are already being included in the program.

```
class Calc
{
char Grade;
int Bonus;
public:
Calc(){Grade='E' ; Bonus=0;}
void Down(int G)
{ Grade= G; }
void Up(int G)
{ Grade+=G; Bonus++; }
void Show()
{ cout<<Grade<<"#"<<Bonus<<endl; }
};
void main()
{
Calc c;
C.Down(97); C.Show();
C.Up(3);      C.Show();
C.Up(-32); C.Show();
}
```

Ans 1.

Undefined symbol C in function main()  
If error is removed then output will be:

a#0  
d#0  
D#0

2. Write the output of the following C++ program code:  
Note: Assume all the required header files are already being included in the program.

```
class Eval
{
char Level;
```

```

int Point;
public:
Eval() {Level='E';Point=0;}
void Sink(int L)
{ Level-= L; }
void Float(int L)
{ Level+= L; Point++; }
void Show()
{ cout<<Level<<"#"<<Point<<endl;
} };
void main()
{ Eval E;
E.Sink(3);
E.Show();
E.Float(7);
E.Show();
E.Sink(2);
E.Show();
}

```

Ans 2.

B#0

I#1

G#1

3. Obtain the output of the following C++ program code:  
Note: Assume all the required header files are already being included in the program.

```

class Player
{
int Score,Level;char Game;
public :
Player(char GGame='A')
{Score=0;Level=1;Game=GGame;}
void Start(int SC) ;
void Next();
void Disp()
{ cout<<Game<<"@"<<Level<<endl;
cout<<Score<<endl;
}};
void main()
{ Player P,Q('B');
P.Disp();
Q.Start(75);
Q.Next();
P.Start(120);
Q.Disp();
P.Disp();
}

```

```

void Player::Next()
{ Game=((Game=='A')?'B':'A'); }
void Player::Start(int SC)
{   Score+=SC;
    if (Score >=100 )
        Level=3;
    else if (Score>=50 )
        Level=2;
    else
        Level=1;
}

```

Ans 3.

A@1

0

A@2

75

A@3

120

4.

Obtain the output of the following C++ program code:

Note: Assume all the required header files are already being included in the program.

```

void in(int x,int y,int &z)
{ x+=y;   y--;   z*=(x-y); }
void out(int z,int y, int &x)
{ x*=y;   y++;   z/=(x+y); }
void main()
{ int a=20, b=30, c=10;
  out(a,c,b);
  cout<<a<<"#"<<b<<"#"<<c<<"#"<<endl;
  in(b,c,a);
  cout<<a<<"@"<<b<<"@"<<c<<"@"<<endl;
  out(a,b,c);
  cout<<a<<"$"<<b<<"$"<<c<<"$"<<endl;
}

```

**Ans**

**4.**

**20#300#10#**

**6020@300@10@**

**6020\$300\$3000\$**

5. Obtain the output of the following C++ program code:

```
#include<iostream.h>
```

```
class TQ
```

```
{
```

```
int r; float s;
```

```

public:
TQ(){ r=1;s=5;}
TQ(TQ &Q)
{ r=Q.r++; s=Q.s+=5; }
void Bonus(float B=5)
{ s+=B; }
void Res() { cout<<r<<', '<<s<<endl;}
};
void main()
{   TQ A;
        A.Res();
        A.Bonus(10);
        A.Res();
        TQ B(A);
        B.Bonus();
        B.Res();
}

```

Ans 5.

1,5

1,15

1,25

6. Obtain the output of the following C++ program code:

```

#include<iostream.h>
class env
{
char pl; int humd,temp;
public:
env()
{ pl='B';humd=100;temp=40; }
void hot(int t=5)
{ temp+=t;}
void humid(int h=10)
{ humd+=h;}
void forecast()
{ cout<<pl<<"++"<<temp<<"&"<<humd<<"%"<<endl; }
};
void main()
{
env A;
A.hot(10);
A.forecast();
A.humid(5);
A.forecast();
A.hot(); A.humid();
A.forecast();
}

```

Ans 6.

**B++50&100%**

**B++50&105%**

**B++55&115%**

7. Obtain the output of the following C++ program code:

```
#include<iostream.h>
void execute (int &x, int y=200)
{
    int temp=x+y; x+=temp;
    if(y!=200)
        cout<<temp<<','<<x<<','<<y<<endl;
}
void main()
{
    int a=10, b=20;
    execute(b);
    cout<<a<<','<<b<<endl;
    execute(a,b);
    cout<<a<<','<<b<<endl;
}

```

**Ans 7.**

**10,240**

**250,260,240**

**260,240**

8. Obtain the output of the following C++ program code:

```
#include<iostream.h>
int a=4;
void func(int x, int &y)
{
    y=x+10;
    x=x+y;
}
void main( )
{
    int a=7;
    func(a, ::a);
    cout<<a<< " ,"<<::a<<endl;
    func(a, ::a);
    cout<<a<< " ,"<<::a<<endl;
    { int a=6; cout<< - - a; }
}

```

**Ans 8.**

**7,17**

**7,17**

**6**

9. Obtain the output of the following C++ program code:

```

#include <iostream.h>
struct PLAY
{ int Score, Bonus;};
void Calculate(PLAY &P, int N=10)
{
P.Score++;P.Bonus+=N;
}

void main()
{
PLAY PL={10,15};
Calculate(PL,5);
cout<<PL.Score<<": "<<PL.Bonus<<endl;
Calculate(PL);
cout<<PL.Score<<": "<<PL.Bonus<<endl;
Calculate(PL,15);
cout<<PL.Score<<": "<<PL.Bonus<<endl;
}

```

**Ans 9.**

**11:20**

**12:30**

**13:45**

10. Obtain the output of the following C++ program code:

```

#include<iostream.h>
struct Package
{ int Length,Breadth,Height;
};
void Occupies(Package M)
{ cout<<M.Length<<"x"<<M.Breadth<<"x";
cout<<M.Height<<endl;
}
void main( )
{ Package P1={10,20,30},P2,P3;
++P1.Height;
Occupies(P1);
P3=P1;
++P3.Length;
P3.Breadth++;
Occupies(P3);
P2=P3;
P2.Height+=50;
P2.Length--;
Occupies(P2);
}

```

**Ans 10.**

**Error: length is not member of 'Package' in function main().**



If 'length' replaced with 'Length' then output will be:

**10x20x31**  
**11x21x31**  
**10x21x81**

11. Obtain the output of the following C++ program code:

```
#include<iostream.h>
void Indirect(int Temp=25)
{ for(int I=15;I<=Temp;I+=5)
  cout<<I<<' ';
  cout<<endl;
}
void Direct(int &Num)
{ Num+=10;
  Indirect(Num);
}
void main( )
{ int Number=10;
  Direct(Number);
  Indirect( );
  cout<<"Number ="<<Number<<endl;
}
```

**Ans 11.**

**15 20**  
**15 20 25**  
**Number=20**

12. Obtain the output of the following C++ program code:

```
#include<iostream.h>
#include<ctype.h>
void main( )
{ char STR[]="WhatOutPut!";
  for(int I=0; STR[I]!='\0';I++)
  { if(!isalpha(STR[I]))
    STR[I]='*';
    else if(isupper(STR[I]))
    STR[I]=STR[I]+1;
    else
    STR[I] =STR[I+1];
  }
  cout<<STR;}
```

**Ans 12.**

**XatOPtPQt!\***

13. Find the output of the following C++ program code:

```
#include <iostream.h>
struct POINT
{ int X, Y, Z;
};
void StepIn(POINT & P, int Step=1)
{ P.X+=Step;
P.Y-=Step;
P.Z+=Step;
}
void StepOut(POINT & P, int Step=1)
{ P.X-=Step;
P.Y+=Step;
P.Z-=Step;
}
void main ( )
{ POINT P1={15, 25, 5}, P2={10, 30, 20};
StepIn(P1);
StepOut(P2,4);
cout<<P1.X<<" " <<P1.Y<<" " <<P1.Z<<endl;
cout<<P2.X<<" " <<P2.Y<<" " <<P2.Z<<endl;
StepIn(P2,12);
cout<<P2.X<<" " <<P2.Y<<" " <<P2.Z<<endl;
}
```

**Ans 13.**

**16 24 6**

**6 34 16**

**18 22 28**

14. Find the output of the following C++ program code:

```
#include<iostream.h>
void SwitchOver(int A[], int N, int Split)
{for (int K=0 ; K<N; K++)
  if (K<Split)
    A[K]+=K;
  else
    A[K]*=K;
}
void Display (int A[], int N)
{for (int K=0 ; K<N ; K++)
  (K%2==0)?cout<<A[K]<<"%":cout<<A[K]<<endl;
}
void main ()
{ int H[]= {30,40,50,20,10,5};
SwitchOver (H,6,3);
Display(H,6);
}
```

**Ans 14.**

**30%41**

**52%60**

**40%25**

58. Write the output of the following C++ program code:

Note: Assume all required header files are already being included in the program .

```
void Position (int &C1, int C2=3)
{
C1+=2;
C2+=Y;
}
void main()
{
int P1=20, P2=4;
Position(P1);
cout<<P1<<" , "<<P2<<endl;
Position(P2,P1);
cout<<P1<<" , "<<P2<<endl;
}
```

**Ans** Error: Undefined symbol y in function definition,  
if Y is declared with some value **then output will be:**

22,4

22,6

59. Write the output of the following C++ program code:

Note: Assume all required header files are already being included in the program.

```
void Location(int &X,int Y=4)
{
Y+=2;
X+=Y;
}
void main()
{
int PX=10,PY=2;
Location(PY);
cout<<PX<<" , "<<PY<<endl;
Location(PX,PY);
cout<<PX<<" , "<<PY<<endl;
}
```

**Ans**

10, 8

20, 8

60. Write the output of the following C++ program code:

```
#include<iostream.h>
#include<ctype.h>
void Mycode(char Msg[],char CH)
{
    for(int cnt=0;Msg[cnt]!='\0';cnt++)
        { if(Msg[cnt]>='B'&& Msg[cnt]<='G')
          Msg[cnt]=tolower(Msg[cnt]);
          else
          if(Msg[cnt]=='N'||Msg[cnt]=='n'||Msg[cnt]==' ')
          Msg[cnt]=CH;
          else
          if(cnt%2==0)
          Msg[cnt]=toupper(Msg[cnt]);
          else
          Msg[cnt]=Msg[cnt-1];
        }
}
void main()
{ char MyText[]="Input Raw";
  Mycode(MyText,'@');
  cout<<"NEW TEXT:"<<MyText<<endl;
}
```

Ans .

New Text:I@PPT@RRW

61.

Obtain the output from the following C++ program as expected to appear on the screen after its execution.

Important Note : - All the desired header files are already included in the code, which are required to run the code.

```
void main()
{ char *Text="AJANTA";
  int *P, Num[]={1,5,7,9}; P=Num;
  cout<<*P<<Text<<endl; Text++;
  P++;
  cout<<*P<<Text<<endl;
}
```

Ans

1AJANTA  
5JANTA

62 . Obtain the output from the following C++ program as expected to appear on the screen after its execution.

```
#include<iostream.h>
void SwitchOver(int A[],int N,int split)
{ for(int K=0;K<N;K++)
  if(K<split)
  A[K]+=K;  else  A[K]*=K;
}
void Display(int A[],int N)
{ for(int K=0;K<N;K++)
(K%2==0)?cout<<A[K]<<"%":cout<<A[K]<<endl;
}
void main() { int H[]={30,40,50,20,10,5};
SwitchOver(H,6,3);
Display(H,6);
}
```

**Ans**

```
30%41
52%60
40%25
```

63.

Find the output of the following program :

```
#include <iostream.h>
#include <ctype.h>
void Changelt(char Text[ ], char C)
{ for (int K=0;Text[K]!='\0';K++)
{ if (Text[K]>='F' && Text[K]<='L')
Text[K]=tolower (Text[K]);
else
if (Text[K]=='E' || Text[K]=='e')
Text[K]=C;
else
if (K%2==0)
Text[K]=toupper(Text[K]);
else
Text[K]=Text[K-1];
}
}
void main ( )
{
char OldText[ ]="pOwERALone";
Changelt(OldText,'%');
cout<<"New TEXT:"<<OldText<<endl;
```

```
}  
Ans New Text : PPW%RR11N%
```

64.

Find. the output of the following program:

```
#include <iostream.h>  
#include <ctype.h>  
void MyCode (char Msg [], char CH)  
{ for (int Cnt=0;Msg[Cnt]!='\0';Cnt++)  
{ if (Msg[Cnt]>='B' && Msg[Cnt]<='G')  
Msg[Cnt]=tolower(Msg[Cnt]);  
else if (Msg[Cnt]=='A' || Msg[Cnt]=='a')  
Msg[Cnt]=CH;  
else if (Cnt%2==0)  
Msg[Cnt]=toupper(Msg[Cnt]);  
else  
Msg[Cnt]=Msg[Cnt-1];  
}  
}  
void main ()  
{ char MyText [] ="ApEACeDriVE";  
MyCode(MyText,'@');  
cout<<"NEW TEXT:"<<MyText<<endl; }
```

Ans .

NEW TEXT : @@e@ccddlle

65. Find the output of the code segment given below:

```
#include<iostream.h>  
void main( )  
{ int A=5,B=10;  
for(int l=1;l<=2;l++)  
{ cout<<"Line1"<<A++<<"&"<<B-2 <<endl;  
cout<<"Line2"<<++B<<"&"<<A+3 <<endl;  
}  
}
```

Ans .

Line15&8  
Line211&9

Line16&9  
Line212&10

66. Find the putput.

```
#include<iostream.h>
void main( )
{ long int NUM=1234543;
  int F=0,S=0;
  do
  { int R=NUM % 10;
    if (R %2!= 0)
    F+= R;
    else
    S+= R;
    NUM/= 10;
  } while (NUM>0);
  cout<<F-S;
}
```

Ans Output: 2

67. Find the output of the following program:

```
#include<iostream.h>
void main( )
{ int var1=5,var2=10;
  for(int i=1;i<=2;i++)
  { cout<<var1++<<'\t'<<--var2<<endl;
    cout<<var2--<<'\t'<<++var1<<endl;
  }
}
```

Ans .

Output:

```
5    9
9    7
7    7
7    9
```

68.What will be the result of following code in C++?

```
#include<iostream.h>
void main()
{ int a=4,b=2,c=6,d=1;
  cout<<(a+6)>=9+b || d*b<=10 && a+b+c/d<<endl;
  cout<<(a--+2*b+++a/d);
```

```
    }  
Ans  
    1  
    12
```

69. Find the output of code given below:

```
#include <iostream.h>  
int main() { int i=0,a=0,b=0,c=0;  
    while(i<=4)  
        { switch(i++)  
            { case 1: ++a; break;  
              case 2:  
              case 3: ++b;  
              case 4: ++c;  
              default: break; } }  
    cout<<"a="<<a<<"b="<<b<<endl; cout<<"c="<<c;  
return 0; }
```

Ans .

```
a=1b=2  
c=3
```

70. What will be the output of the following code fragment?

```
#include<iostream.h>  
int x=10;  
void test( int a,int &b,int c=5)  
{ a+=x+c; b=x*c; c=x/c;  
cout<<a<<","<<b<<","<<c<<endl; }  
void main( )  
{ int x=10,y=20;  
test(x,y,::x);  
cout<<x<<","<<y<<","<<::x<<endl;  
test(::x,x,y); cout<<::x<<endl; }
```

Ans

```
30,100,1  
10,100,10  
120,1000,0  
10
```

71. Find the output of the following program:2

```
#include <iostream.h>  
#include <ctype.h>  
void Encode (char Info [ ], int N) ;
```



```

void main ( )
{ char Memo[ ]= "Justnow" ;
  Encode (Memo,2) ;
  cout<<Memo<<endl ;
}
void Encode (char Info [ ], int N)
{ for (int I = 0;Info[I] !='\0';I++)
  if (I%2==0)
    Info[I] = Info[I] -N ;
  else if (islower(Info[I]))
    Info[I] = toupper(Info[I]) ;
  else
    Info[I] = Info[I] +N ;
}

```

Ans .

HuqTlOu

72.Find the output of the following program:2

```

#include <iostream.h>
#include <ctype.h>
void Secret (char Mig[ ], int N);
void main ( )
{ char SMS[ ] = "rEPorTmE" ;
  Secret{SMS,2);
  cout<<SMS<<endl;
}
void Secret(char Msg[ ], int N)
{ for (int C=0; Msg[C] !=' \0' ;C++)
  if (C%2==0)
    Msg[C] = Msg[C]+N;
  else if (isupper(Msg[C]))
    Msg[C] = tolower(Msg[C]);
  else
    Msg[C] = Msg[C]-N;
}

```

Ans teRmttoe

### CONSTRUCTORS AND DESTRUCTORS

Q13 Observe the following C++ code and answer the questions (i) and (ii) :

```

class Traveller
{
  long PNR;
  char TName[20];
public :

```

```

Traveller() //Function 1
{cout<<"Ready"<<endl;}
void Book(long P,char N[]) //Function 2
{PNR = P; strcpy(TName, N);}
void Print() //Function 3
{cout<<PNR << TName <<endl;}
~Traveller() //Function 4
{cout<<"Booking cancelled!"<<endl;}
};

```

(i) Fill in the blank statements in Line 1 and Line 2 to execute Function 2 and Function 3 respectively in the following code:

```

void main()
{
Traveller T;
_____ //Line 1
_____ //Line 2
} //Stops here

```

(ii) Which function will be executed at } //Stops here? What is this function referred as ?

Ans

(i) T.Book(1234567,"Ravi"); //Line 1  
T.Print(); //Line 2

(ii)

Function 4

OR

~Traveller()

It is a Destructor function.

Q14. Observe the following C++ code and answer the questions (i) and (ii) :

```

class Passenger
{
long PNR;
char Name [20] ;
public:
Passenger() //Function 1
{ cout<<"Ready"<<endl; }
void Book(long P,char N[]) //Function 2
{ PNR = P; strcpy(Name, N); }
void Print() //Function 3
{ cout<<PNR << Name <<endl; }
~Passenger() //Function 4
{ cout<<"Booking cancelled!"<<endl; }
};

```

(i) Fill in the blank statements in Line 1 and Line 2 to execute Function 2 and Function 3 respectively in the following code:

```

void main()
{
Passenger P;
_____ //Line 1

```

```
_____ //Line 2  
} //Ends here
```

(ii) Which function will be executed at } //Ends here? What is this function referred as?

Ans .

```
(i) P.Book(1234567, "Ravi"); //Line 1  
P.Print(); //Line 2
```

(ii) Function 4

**OR**

```
~Passenger()
```

It is a Destructor function.

Q15 . Answer the questions (i) and (ii) after going through the following class :

class Health

```
{  
int PId, DId;  
public:  
Health (int PPId) ; // Function 1  
Health ( ) ; // Function 2  
Health (Health &H); //Function 3  
void Entry ( ) ; // Function 4  
void Display( ) ; // Function 5  
};
```

```
void main ( )
```

```
t
```

```
Health H (20) ; //statement 1
```

```
}
```

(i) Which of the function out of Function 1,2,3, 4 or 5 will get executed when the Statement I is executed in the above code ?

(ii) Write a statement to declare a new object G with reference to already existing object H using Function 3.

Ans

(i) Function1 will be executed.

(ii) Health G(H)

Q16. Answer the questions (i) and (ii) after going through the following class:

```
class TEST  
{  
int Regno, Max, Min, Score;  
public:  
TEST() //Function 1  
{  
Regno= 101;  
Max=100;  
Min=40;  
Score=75;
```

```

}
TEST(int Pregno,int Pscore) //Function 2
{
Regno=Pregno;
Max=100;
Min=40;
Score=Pscore;
}
~TEST() //Function 3
{
cout<<"TEST Over"<<endl;
}
void Display() //Function 4
{
cout<<Regno<<":"<<Max<<":"<<Min<<endl;
cout<<"[Score]"<<Score<<endl;
}};

```

(i) As per Object Oriented Programming, which concept is illustrated by **Function 1 and Function 2** together?

(ii) What is **Function 3** specifically referred as? When do you think, **Function 3** will be invoked/called?

Ans (i) Polymorphism (OR) Function Overloading (OR) Constructor Overloading  
(ii) Destructor, invoked or called when Object goes out of a scope.

**Q17 .Answer the questions (i) and (ii) after going through the following class:**

```

class Race
{
    int CarNo, Track;
public:
Race(); // Function 1
Race(int CN); // Function 2
Race(Race &R); // Function 3
void Register(); // Function 4
void Drive(); // Function 5
};
void main()
{
    Race R;
}

```

(i) Out of the following, which of the option is correct for calling Function 2?

Option 1- Race T(30);

Option 2- Race U(R);

(ii) Name the feature of Object Oriented Programming, which is illustrated by Function 1, Function 2 and Function 3 combined together.

Ans (i) Option 1- Race T(30); is correct

(ii) Constructor overloading.

**Q18.** Answer the questions after going through the following class.

```

class Exam
{
    char Subject[20] ;
    int Marks ;
}

```

```

public :
    Exam()                // Function 1
    { strcpy(Subject, "Computer" ) ; Marks = 0 ;}

    Exam(char P[ ]) // Function 2
    {
        strcpy(Subject, P) ;
        Marks=0 ;
    }
    Exam(int M)          // Function 3
    {
        strcpy(Subject, "Computer") ; Marks = M ;
    }
    Exam(char P[ ], int M) // Function 4
    { strcpy(Subject, P) ; Marks = M ;    } };

```

(i) Which feature of the Object Oriented Programming is demonstrated using Function 1, Function2, Function 3 and Function 4 in the above class Exam?

(ii) Write statements in C++ that would execute Function 3 and Function 4 of class Exam.

Ans (i) Function Overloading (Constructor overloading)

(ii) Exam A(10) and Exam B("Comp", 10)

Q19. Answer the questions (i) and (ii) after going through the following class:

```

class Exam
{
int Rno,MaxMarks,MinMarks,Marks;
public:
Exam ( ) //Module 1
{
Rno=101;
MaxMarks=100;
MinMarks=40;
Marks=75;
}
Exam (int Prno, int Pmarks) //Module 2
{ Rno=Prno;
MaxMarks=100;
MinMarks=40;
Marks=Pmarks;
}
~Exam () //Module 3
{
cout<<"Exam Over"<<endl;
}
void Show () //Module 4
{
cout<<Rno<<". "<<MaxMarks<<". "<<MinMarks<<endl;
cout<<"[Marks Got]"<<Marks<<endl;
}
};

```

- (i) As per Object Oriented Programming, which concept is illustrated by **Module 1** and **Module 2** together?
- (ii) What is **Module 3** referred as ? When do you think, **Module 3** will be invoked/called?

Ans (i) Polymorphism (OR) Constructor Overloading (OR) Function Overloading.

(ii) Destructor. It is invoked as soon as the scope of the object gets over.

Q20. Consider the following declaration:

```
class welcome
{
public:
    welcome (int x, char ch); // constructor with parameter
    welcome(); // constructor without parameter
    void compute();
private:
    int x; char ch;
};
```

Which of the following are valid statements?

```
welcome obj (33, 'a9');
welcome obj1(50, '9');
welcome obj3();
obj1= welcome (45, 'T');
```

**Ans**

Valid and invalid statements are

```
welcome obj (33, 'a9');    valid
welcome obj1(50, '9');    valid
welcome obj3();           invalid
obj1= welcome (45, 'T');  valid
```

Q21. Answer the questions (i) and (ii) after going through the following program:

```
class TestMeOut
{ public:
~TestMeOut() //Function 1
{
cout<<"Leaving the examination hall"<<endl;
}
TestMeOut() //Function 2
{
cout<<"Appearing for examination"<<endl;
}
void MyWork( )
{
cout<<"Attempting Questions"<<endl;
}
};
```

(i) In Object Oriented programming what is Function 1 referred as and when does it get invoked/called?

(ii) In Object Oriented Programming, what is Function 2 referred as and when does it get invoked/called?

Ans (i) Function 1 is called as Destructor, It will automatically executed at the time of destruction of the object of class TestMeOut.

(ii) Function 2 is called as constructor (Non-parameterized or default constructor) ,it will automatically executed at the time of creation of the object of class TestMeOut.

Q22.

Answer the following questions (i) and (ii) after going through the following class.

```
class Test
{ char Paper[20];
  int Marks
public:
  Test() //Function 1
  { strcpy(Paper, "Computer");
    Marks=0;
  }
  //Function 2
  Test(char P[])
  { strcpy(Paper,P);
    Marks=0;
  }
  //Function 3
  Test(int M)
  { strcpy(Paper,"Computer");
    Marks=M;
  }
  Test(char P[],int M)
  //Function 4
  { strcpy(Paper,P);
    Marks=M;
  }
};
```

(i)Which feature Object Oriented programming is demonstrated using Function 1, Function 2, Function 3 and Function 4 in the above class text?

(ii)Write statements in C++ that would execute Function 2 and Function 4 of class Text.

Ans

(i) Function overloading (here it is constructor overloading).

(ii) (**let** char name[20]; int X=30; strcpy(name, "SCIENCE"); are declared in the program)

Test A(name); //Will execute Function 2

Test B(name,X); //Will execute Function 4

#### 4 Marks Questions of classes & Inheritance

1. Write the definition of a class PIC in C++ with following description:

Private Members

Pno //Data member for Picture Number (an integer)

Category //Data member for Picture Category (a string)

Location //Data member for Exhibition Location (a string)

FixLocation /\* A member function to assign Exhibition Location as per category as shown in the following table \*/

| Category | Location |
|----------|----------|
| Classic  | Amina    |

|         |            |
|---------|------------|
| Modern  | Jim Plaḡ   |
| Antique | Ustad Khan |

### Public Members

Enter()// A function to allow user to enter values  
Pno,category and call //FixLocation() function  
SeeAll() // A function to display all the data members

Sol

```
class PIC
{
    int Pno; char Category[20]; char Location[20];
    void FixLocation();
public:
    void Enter();
    void SeeAll();
};

void PIC::FixLocation()
{
    if(strcmpi(Category,"Classic")==0)
        strcpy(Location,"Amina");
    else if(strcmpi(Category,"Modern")==0)
        strcpy(Location," Jim Plaḡ" );
    else if strcmpi(Category,"Antique")==0)
        strcpy(Location," Ustad Khan" );
}

void PIC::Enter()
{
    cin>>Pno;gets(Category);
    FixLocation();
}

void PIC:: SeeAll()
{
    cout<<Pno<<Category<<Location<<endl;
}
}
```

## 2. Write the definition of a class Photo in C++ with following description:

Private Members

Pno //Data member for Photo Number (an integer)  
Category //Data member for Photo Category (a string)  
Exhibit //Data member for Exhibition Gallery (a string)  
FixExhibit// A member function to assign Exhibition Gallery as per  
Category  
//as shown in the following table

| Category | Exhibit  |
|----------|----------|
| Antique  | Zaveri   |
| Modern   | Johnsen  |
| Classic  | Terenida |

Public Members

Register()// A function to allow user to enter values  
//Pno,Category and call FixExhibit()function



ViewAll()// A function to display all the data members

Sol

```
class Photo
{ int Pno; char Category[20]; char Exhibit[20];
void FixExhibit();
public:
void Register();
void ViewAll();
};
void Photo::FixExhibit()
{
if(strcmpi(Category,"Antique")==0)
strcpy(Exhibit,"Zaveri");
else if(strcmpi(Category,"Modern")==0)
strcpy(Exhibit,"Johnsen");
else if strcmpi(Category,"Classic")==0)
strcpy(Exhibit,"Terenida");
}
void Photo::Register()
{ cin>>Pno;gets(Category);
FixExhibit();
}
void Photo::ViewAll()
{
cout<<Pno<<Category<<Exhibit<<endl;
}
```

3. **Define a class CONTEST** in C++ with the following description:

**Private Data Members**

Eventno integer

Description char(30)

Score integer

qualified char

Public Member functions

- A constructor to assign initial values Eventno as 11, Description as ``School level'', Score as 100, qualified as 'N'.
- Input() - To take the input for Eventno, description and score.
- Award (int cutoffscore) - To assign qualified as 'Y', if score is more than the cutoffscore that is passed as argument to the function, else assign qualified as 'N'.
- Displaydata() - to display all data members.

**Sol class CONTEST**

```
{ int Eventno; char Description[30]; int Score; char
qualified;
public:
```

```

    CONTEST(){ Eventno=11; strcpy(Description,"School
level");
                Score=100; qualified='N' ; }
void Input()
{ cin>>Eventno; gets(Description);cin>>score; }
void Award( int Cutoffscore)
{
    if(Score>Cutoffscore)
        qualified='Y' ;
    else
        qualified='N' ;
}
void Displaydata()
{cout<<"Event Number is"<<Eventno<<endl;
  cout<<"description is"<<Description<<endl;
  cout<<"Score is"<<Score<<endl;
  cout<<"Qualified is"<<qualified;
}
};

```

4. Define a class **Tourist** in C++ with the following specification:

Data Members

- CNo - to store Cab No
- CType - to store a character 'A', 'B', or 'C' as City Type
- PerKM - to store per Kilo Meter charges
- Distance - to store Distance travelled (in KM)

Member Functions

- A constructor function to initialize CType as 'A' and CNo as '0000'
- A function CityCharges( ) to assign PerKM as per the following table :
 

| Ctype | PerKM |
|-------|-------|
| A     | 20    |
| B     | 18    |
| C     | 15    |
- A function RegisterCab() to allow administrator to enter the values for CNo and CType. Also, this function should call CityCharges() to assign PerKM Charges.
- A function Display() to allow user to enter the value of Distance and display CNo, CType, PerKM, PerKM\*Distance (as Amount) on screen.

Sol

```

class Tourist
{ int CNo; char CType; int PerKM; int Distance;
public :
    Tourist() { CNo=0000; CType='A' ; }
void CityCharges()
{    if (CType='A') PerKM=20;

```

```

        else if (CType=='B') PerKM=18;
        else if (CType=='C') PerKM=15;
    }
    void Register (abc)
    { cout<<"enter cab no. "; cin>>CNo;
      cout<<"enter cab type"; cin>>CType;
      CityCharges();
    }
    void Display()
    { cout<<"enter distance";cin>>Distance;
      cout<<"cab no is"<<CNo<<endl;
      cout<<"cab type is"<<CType<<endl;
      cout<<"PerKm"<<PerKM<<endl;
      cout<<"Amount is"<<PerKM*Distance<<endl;
    }
};

```

5. Define a class **ITEM** in C++ with following description:

**Private Members**

- \_ Code of type integer (Item Code)
- \_ Iname of type string (Item Name)
- \_ Price of type float (Price of each item)
- \_ Qty of type integer (Quantity of item in stock)
- \_ Offer of type float (Offer percentage on the item)
- \_ A member function GetOffer() to calculate Offer percentage as per the following rule:  
 If Qty<=50 Offer is 0  
 If 50<Qty<=100 Offer is 5  
 If Qty>100 Offer is 10

**Public Members**

- A function GetStock() to allow user to enter values for Code, Iname, Price, Qty and call function GetOffer() to calculate the offer
- A function ShowItem() to allow user to view the content of all the data members

**Sol**

```

class ITEM
{
int Code;char Iname[20];float Price; int Qty;
float Offer;
void GetOffer() ;
public:
void GetStock ()
{ cin>>Code; gets (Iname) ;
  cin>>Price>>Qty;
  GetOffer() ;
}
void ShowItemn ( )
{
cout<<Code<<Iname<<Price<<Qty<<Offer;

```

```

};
void ITEM: : GetOffer ()
{
if (Qty<=50)
Offer = 0;
else if (Qty <=100)
Offer = 5;
else
Offer = 10;
}

```

**6. Define a class STOCK in C++ with following description:**

Private Members

- \_ ICode of type integer (Item Code)
- \_ Item of type string (Item Name)
- \_ Price of type float (Price of each item)
- \_ Qty of type integer (Quantity in stock)
- \_ Discount of type float (Discount percentage on the item)
- \_ A member function FindDisc() to calculate

discount as per the following rule:

If Qty<=50 Discount is 0, If 50<Qty<=100 Discount is 5

If Qty>100 Discount is 10

**Public Members** \_ A function Buy() to allow user to enter values

for ICode, Item, Price, Qty and call function FindDisc() to calculate the Discount.

\_ A function ShowAll() to allow user to view the content of all the data members.

```

Sol
class STOCK
{ int ICode,Qty; char Item[20]; float Price,Discount;
void FindDisc();
public:
void Buy();
void ShowAll();
} ;
void STOCK::Buy()
{ cin>>ICode;
gets(Item);
cin>>Price;
cin>>Qty;
FindDisc();
}
void STOCK::FindDisc()
{ if (Qty<=50)
Discount=0;
else if (Qty<=100)
Discount=5;
Else
Discount=10;
}

```

```

}
void STOCK::ShowAll()
{ cout<<ICode<<' \t'<<Item<<' \t'<<Price<<' \t'<<Qty
<<' \t'<<Discount<<endl;
}

```

7. Define a class **RESORT** in C++ with following description:

**Private Members**

```

_ Rno //Data member to store Room No
_ Name //Data member to store customer name
_ Charges //Data member to store per day charges
_ Days //Data member to store number of days of stay
_ COMPUTE( )//A function to calculate and return Amount as
Days*Charges & if the value of Days*Charges is more than 11000
then as 1.02*Days*Charges

```

**Public Members**

```

_ Getinfo ( ) //A function to enter the content
Rno,Name,Charges & Days
_ Dispinfo ( ) //A function to display Rno,Name, Charges,Days
and Amount (Amount to be displayed by calling function COMPUTE
( ) )

```

```

Sol class RESORT
{ int Rno;
char Name [20];
float Charges;
int Days;
float COMPUTE();
public:
void Getinfo() ;
void Dispinfo();
};
void RESORT::Getinfo()
{ cin>>Rno;
gets (Name);
cin>>Charges;
cin>>Days;
}
void RESORT::Dispinfo()
{ cout<<Rno<<" "<<Name<<" "<<Charges<<"
"<<Days<< COMPUTE()<<endl;
} float RESORT::COMPUTE()
{
float Amount = Charges*Days;
if (Amount>11000)
Amount = 1.02*Days*Charges;
return Amount;
}

```

8. Define a class **HOTEL** in C++ with the following description:

**Private Members:**

```
_ Rno //Data member to store Room No
_ Name //Data member to store customer name
_ Tariff //Data member to store per day charges
_ NOD //Data member to store number of days of stay
_ CALC( ) /*A function to calculate and return Amount as
NOD*Tariff and if the value of NOD*Tariff is more than 10000
then as 1.05*NOD*Tariff */
```

**Public Members**

```
_ Checkin ( ) / / A function to enter the content Rno, Name,
Tariff and NOD
_ Checkout( ) / / A function to display Rno,Name, Tariff,NOD
and Amount (Amount to be displayed by calling function CALC(
))
```

```
Sol
class HOTEL
{ int Rno; char Name[20];float Tariff; int NOD;
float CALC() ;
public:
void Checkin() ;
void Checkout() ;
} ;
float HOTEL::CALC()
{ float Amount = Tariff*NOD;
if (Amount>10000)
Amount = 1.05*NOD*Tariff;
return Amount;
}
void HOTEL::Checkin()
{
cin>>Rno;
gets (Name);
cin>>Tariff;
cin>>NOD;
}
void HOTEL::Checkout()
{
cout<<Rno<<" "<<Name<<" "<<Tariff<<"
"<<NOD<<CALC ()<<endl;
}
```

9. Define a class TEST in C++ with following description:

**Private Members**

- TestCode of type integer
- Description of type string
- NoCandidate of type integer
- CenterReqd (number of centers required) of type integer
- A member function CALCNTR() to calculate and return the number of centers as (NoCandidates/100+1)

**Public Members**

- A function SCHEDULE() to allow user to enter values for TestCode, Description, NoCandidate & call function CALCNTR() to calculate the number of Centres
- A function DISPTTEST() to allow user to view the content of all the data members

```
Sol class TEST
{
    int TestCode; char Description[20];
    int NoCandidate, CenterReqd;
    void CALCNTR();
public:
    void SCHEDULE();
    void DISPTTEST();
};
void TEST::CALCNTR()
{
    CenterReqd=(NoCandidate/100 + 1);
}
void TEST::SCHEDULE()
{
    cout<<"Test Code :";cin>>TestCode;
    cout<<"Description :";gets(Description);
    cout<<"Number :";cin>>NoCandidate;
    CALCNTR();
}
void TEST::DISPTTEST()
{
    cout<<"Test Code :"<<TestCode<<endl;
    cout<<"Description :"<<Description<<endl;
    cout<<"Number :"<<NoCandidate<<endl;;
    cout<<"Centres :"<<CenterReqd<<endl;;
}
}
```

10. Define a class in C++ with following description:

**Private Members**

- A data member Flight number of type integer
- A data member Destination of type string
- A data member Distance of type float
- A data member Fuel of type float
- A member function CALFUEL() to calculate the value of Fuel as per the

following criteria:

| Distance                  | Fuel |
|---------------------------|------|
| <=1000                    | 500  |
| more than 1000 and <=2000 | 1100 |
| More than 2000            | 2200 |

**Public Members**

- A function FEEDINFO() to allow user to enter values for Flight Number, Destination, Distance & call function CALFUEL() to calculate the quantity of Fuel.
- A function SHOWINFO() to allow user to view the content of all the data members

```

Sol class FLIGHT
{
    int Fno; char Destination[20];
    float Distance, Fuel;
    void CALFUEL();
public:
    void FEEDINFO();
    void FEEDINFO();
    void SHOWINFO();
};
void FLIGHT::CALFUEL()
{
    if (Distance<=1000)
        Fuel=500;
    else
        if (Distance<=2000)
            Fuel=1100;
        else
            Fuel=2200;
}
void FLIGHT::FEEDINFO()
{
    cout<<"Flight No :"; cin>>Fno;
    cout<<"Destination :"; gets(Destination);
    cout<<"Distance :"; cin>>Distance;
    CALFUEL();
}
void FLIGHT::SHOWINFO()
{
    cout<<"Flight No :"<<Fno<<endl;
    cout<<"Destination :"<<Destination<<endl;
    cout<<"Distance :"<<Distance<<endl;
    cout<<"Fuel :"<<Fuel<<endl; }

```

11 Define a class Clothing in C++ with the following descriptions:

**Private Members:**

Code of type string

Type of type string

Size of type integer

Material of type string

Price of type float

A function Calc\_Price() which calculates and assigns the value of Price as follows:

For the value of Material as "COTTON"

| Type    | Price (Rs.) |
|---------|-------------|
| TROUSER | 1500        |
| SHIRT   | 1200        |

For Material other than "COTTON" the above mentioned Price gets reduced by 25%.

**Public Members:**

A constructor to assign initial values of Code, Type and Material with the word "NOT ASSIGNED" and Size and Price with 0.



A function Enter () to input the values of the data members Code, Type, Size and Material and invoke the CalcPrice() function.

A function Show () which displays the content of all the data members for a Clothing.

```
Sol class Clothing
{
    char Code[25], Type[25];
    int Size ; char Material[30];
    float Price;
public:
    Clothing();
    void Calc_Price();
    void Enter();
    void Show();
};

Clothing::Clothing()
{
    strcpy(Code,"NOT ASSIGNED");
    strcpy(Type,"NOT ASSIGNED");
    Size=0;
    strcpy(Material,"NOT ASSIGNED");
    Price=0;
}

void Clothing::Calc_Price() or void Clothing::CalcPrice()
{if(strcmp(Type,"TROUSER") == 0 && strcmp(Material,"COTTON")
== 0)
        Price=1500;
else if (strcmp(Type,"SHIRT") == 0 &&
strcmp(Material,"COTTON") == 0)
        Price=1200;
else if (strcmp(Type,"TROUSER")==0 &&
strcmp(Material,"COTTON")!=0)
        Price=1500*0.75;
else if (strcmp(Type,"SHIRT")==0)&&
strcmp(Material,"COTTON")!=0 )
        Price=1200*0.75;
}

void Clothing::Enter()
{
    gets(Code); // or cin >> Code;
    gets(Type); // or cin >> Type;
    cin>>Size;
    gets(Material); // or cin >> Material;
    Calc_Price(); OR CalcPrice();
}

void Clothing::Show()
{
    cout<<Code<<Type<<Size<<Material<<Price<<endl;
}
}
```

12. Define a class Travel in C++ with the description given below:

### Private Members:

T\_Code of type string  
No\_of\_Adults of type integer  
No\_of\_Children of type integer  
Distance of type integer  
TotalFare of type float

### Public Members:

A constructor to assign initial values as follows :

T\_Code with the word "NULL"

No\_of\_Adults as 0

No\_of\_Children as 0

Distance as 0

TotalFare as 0

A function AssignFare( ) which calculates and assigns the value of the data member TotalFare as follows :

For each Adult

| Fare (Rs) | Distance (Km) |
|-----------|---------------|
| 500       | >=1000        |
| 300       | <1000 & >=500 |
| 200       | <500          |

For each Child the above Fare will be 50% of the Fare mentioned in the above table.

For example :

If Distance is 750, No\_of\_Adults = 3 and No\_of\_Children = 2

Then TotalFare should be calculated as No\_of\_Adults \* 300

+ No\_of\_Children \* 150 i.e.  $3 * 300 + 2 * 150 = 1200$

• A function EnterTraveK ) to input the values of the data members

T\_Code, No\_of\_Adults, No\_of\_Children and Distance; and invoke the AssignFare( ) function.

• A function ShowTraveK) which displays the content of all the data members for a Travel.

### Sol class Travel

```
{    char TCode[5]; //OR char *Tcode;
    int No_of_Adults;
    int No_of_Children;
    int Distance;
    float TotalFare;
public:
    Travel();
    void AssignFare();
    void EnterTravel();
    void ShowTravel();
};
Travel::Travel() //Constructor
{    strcpy(TCode, "NULL");
    // OR TCode[0]='\0' OR strcpy(TCode, "\0")
// OR TCode=NULL if TCode is declared as char pointer
    No_of_Adults = 0;
    No_of_Children = 0;
```

```

        Distance = 0;
        TotalFare = 0;
    }
    void Travel::AssignFare()
    {
        if(Distance>=1000)
            TotalFare =
            500*No_of_Adults+250*No_of_Children;
        else
            if (Distance >= 500)
                TotalFare =
                300*No_of_Adults+150*No_of_Children;
            else
                TotalFare =
                200*No_of_Adults+100*No_of_Children;
    }
    void Travel::EnterTravel()
    {
        gets(TCode); // or cin >> TCode;
        cin>>No_of_Adults>>No_of_Children>>Distance;
        AssignFare();
    }
    void Travel::ShowTravel()
    {
        cout<<TCode<<No_of_Adults<<No_of_Children<<Distance<<TotalFare
        <<endl;
    }
}

```

13.

Define a class Candidate in C++ with following description:

Private Members

\_ A data member RNo (Registration Number) of type long

\_ A data member Name of type string

\_ A data member Score of type float

\_ A data member Remarks of type string

A member function AssignRem( ) to assign Remarks as per the Score

obtained by a candidate. Score range and the respective Remarks are

shown as follows:

| Score        | Remarks      |
|--------------|--------------|
| >=50         | Selected     |
| less than 50 | Not selected |

Public Members

\_ A function ENTER ( ) to allow user to enter values for RNo, Name,

Score & call function AssignRem( ) to assign the remarks.

\_ A function DISPLAY ( ) to allow user to view the content of all the data members.

**sol class Candidate**

```
{ long RNo; char Name[20]; float Score; char Remarks[20];
```

```

void AssignRem( ) ;
public:
void Enter( );
void Display( );
};
void Candidate: :AssignRem( )
{
if (Score>=50)
strcpy (Remarks,"Selected") ;
else
strcpy(Remarks,"Not Selected") ;
}
void Candidate: : Enter ( )
{
cin>>RNo ;
gets (Name) ; cin>>Score;
AssignRem( ) ;
}
void Candidate: :Display()
{
cout<<RNo<<Name<<Score<<Remarks<<endl;
}

```

14. Define a class TAXPAYER in C++ with following description:

Private members :

- Name of type string
- PanNo of type string
- Taxabincm (Taxable income) of type float
- TotTax of type double
- A function CompTax( ) to calculate tax according to the following slab:

| Taxable Income       | Tax% |
|----------------------|------|
| Up to 160000         | 0    |
| >160000 and <=300000 | 5    |
| >300000 and <=500000 | 10   |
| >500000              | 15   |

Public members :

- A parameterized constructor to initialize all the members
- A function INTAX( ) to enter data for the tax payer and call function CompTax( ) to assign TotTax.

A function OUTAX( ) to allow user to view the content of all the data members.

**So1 class TAXPAYER**

```

{
    char Name[30],PanNo[30]; float Taxabincm; double TotTax;
    void CompTax()
    {

```

```

        if(Taxabincm >500000)
            TotTax= Taxabincm*0.15;
        else if(Taxabincm>300000)
            TotTax= Taxabincm*0.1;
        else if(Taxabincm>160000)
            TotTax= Taxabincm*0.05;
        else
            TotTax=0.0;
    }
public:
    TAXPAYER(char nm[ ], char pan[ ], float tax, double tax) //parameterized
    constructor
    {
        strcpy(Name,nm);
        strcpy(PanNo,pan);
        Taxabincm=tax;
        TotTax=ttax;
    }

    void INTAX()
    {
        gets(Name);
        cin>>PanNo>>Taxabincm;
        CompTax();
    }
    void OUTAX()
    { cout<<Name<<'\n'<<PanNo<<'\n'<<Taxabincm<<'\n'<<TotTax<<endl; }
};

```

15.

Define a class Applicant in C++ with following description:

Private Members

- A data member ANo ( Admission Number) of type long
- A data member Name of type string
- A data member Agg(Aggregate Marks) of type float
- A data member Grade of type char
- A member function GradeMe( ) to find the Grade as per the Aggregate Marks obtained by a student. Equivalent Aggregate marks range and the respective Grades are shown as follows

| Aggregate Marks         | Grade |
|-------------------------|-------|
| > = 80                  | A     |
| Less than 80 and > = 65 | B     |
| Less than 65 and > = 50 | C     |
| Less than 50            | D     |

Public Members

- A function Enter( ) to allow user to enter values for ANo, Name, Agg & call function GradeMe( ) to find the Grade

- A function Result ( ) to allow user to view the content of all the data members.

**So1 class Applicant**

```

{   long ANo; char Name[25]; float Agg; char Grade;
    void GradeMe( )
    {
        if (Agg >= 80)
            Grade = 'A';
        else if (Agg >= 65 && Agg < 80 )
            Grade = 'B';
        else if (Agg >= 50 && Agg < 65 )
            Grade = 'C';
        else
            Grade = 'D';
    }
public:
    void Enter ( )
    { cout << "\n Enter Admission No. "; cin >> ANo;
      cout << "\n Enter Name of the Applicant "; cin.getline(Name,25);
      cout << "\n Enter Aggregate Marks obtained by the Candidate :";
      cin >> Agg;
      GradeMe( );
    }
    void Result( )
    {
        cout << "\n Admission No. " << ANo;
        cout << "\n Name of the Applicant " << Name;
        cout << "\n Aggregate Marks obtained by the Candidate. " << Agg;
        cout << "\n Grade Obtained is " << Grade ;
    }
};

```

16.

Define a class ORDER in C++ with following description:

Private Members

- ICode of type integer (Item Code)
- Item of type string (Item Name)
- Price of type float (Price of each item)
- Qty of type integer (Quantity in stock)
- Discount of type float (Discount percentage on the item)

- A member function FindDisc() to calculate discount percentage as per the following rule:

|                    |                |
|--------------------|----------------|
| If Qty < =50       | Discount is 0  |
| If 50 < Qty < =100 | Discount is 5  |
| If Qty > 100       | Discount is 10 |

#### Public Members

- A function Buy () to allow user to enter values for ICode, Item, Price, Qty and call function FindDisc() to calculate Discount.
- A Function ShowAll() to allow user to view the content of all the data members.

```
Sol class ORDER
{ int ICode; char Item [ 20 ] ; float Price; int Qty; float
Discount;
void FindDisc();
public:
void Buy()
{ cin >> ICode;
  gets(Item);
  cin >> Price >> Qty;
  FindDisc();
}
void ShowAll()
{ cout << ICode << Item << Price<< Qty << Discount; }
};

void STOCK::FindDisc()
{
if (Qty < =50)
Discount=0;
else if (Qty < =100)
Discount=5;
else
Discount=10;
}
```

17. Define a class TravelPlan in C++ with the following descriptions:

#### Private Members:

|                      |                                  |
|----------------------|----------------------------------|
| Plan Code            | of type long                     |
| Place                | of type character array (string) |
| Number_of_travellers | of type integer                  |
| Number_of_buses      | of type integer                  |

#### Public Members:

A constructor to assign initial values of PlanCode as 1001, Place as "Agra", Number\_of\_travellers as 5, Number\_of\_buses as 1

A function NewPlan() which allows user to enter PlanCode, Place and Number\_of\_travellers. Also, assign the value of Number\_of\_buses as per the following conditions:

| Number_of_travellers                      | Number_of_buses |
|-------------------------------------------|-----------------|
| Less than 20                              | 1               |
| Equal to or more than 20 and less than 40 | 2               |
| Equal to 40 or more than 40               | 3               |

A function ShowPlan() to display the content of all the data members on screen

Sol class TravelPlan

```

{
    long PlaceCode;
    char Place[30];
    int Number_of_travellers;
    int Number_of_buses;
public:
    TravelPlan()
    {
        PlanCode=1001;
        Place="Agra";
        Number_of_travellers=5;
        Number_of_buses=1;
    }
    void NewPlan()
    {
        cout << "Enter Plan Code:";
        cin >> PlanCode;
        cout << "\n Enter Place:";
        gets(Place);
        cout << "\n Enter Plan:";
        cin >> Plan;
        cout << "\n Enter the number of travellers:";
        cin >> Number_of_travellers;
        if(Number_of_travellers >= 40)
            Number_of_buses=3;
        else if(Number_of_travellers >=20)
            Number_of_buses=2;
        else
            Number_of_buses=1;
    }
    void ShowPlan()
    {
        cout << "\n Plan Code: " << PlanCode << endl;
        cout << "\n Place Name: " << Place << endl;
        cout << "\n Number_of_travellers:" << Number_of_travellers << endl;
        cout << "\n Number_of_buses: " << Number_of_buses;
    }
};

```



18. A dining hall can accommodate only 50 guests. Define a class to store seat number and name of the guests who are seated on first come first seated basis. Define functions to display details of any seat number and to display the current seating situation. Write a program to show the working of this class.

```
Sol #include < iostream.h>
#include < ctype.h>
class DH{int seat;
    char name[20];
    static int taken;
public:
    void getdata(){
        taken++;
        cout<<"\nSeat Number = "<< taken;
        cout<<"\nName = ";
        cin.getline(name,20);
        seat=taken;
    }
    static void status(){
        cout<<"\nTotal Seats = 50";
        cout<<"\nSeats Taken = "<< taken;
        cout<<"\n Available = "<< 50-taken;
    }
    void disp( ){
        cout<<"\nSeat No. = "<< seat;
        cout<<"\nName = "<< name;
    }
};
DH ob[50];
int DH::taken;

void main()
{
    int i,s;
    char mo='Y',c;
    for(i=0;mo=='Y' && i<50;i++){
        ob[i].getdata();
        DH::status();
        cout<<"\nMore? (Y/N) ";
        cin>>mo;
        mo=toupper(mo);
        c=cin.get();
    }
    cout<<"Enter Seat No. to display";
    cin>>s;
    ob[s-1].disp();
}
```

19.

Define a class named Tour in C++ with following description?

Private members:

|                            |                                                          |
|----------------------------|----------------------------------------------------------|
| tcode                      | integer (Ranges 6 - 10)                                  |
| adults, children, distance | integer                                                  |
| totalfare                  | float                                                    |
| AssignFare( )<br>member    | A function which calculates and assign the value to data |

totalfare as follows:-

|                     |         |          |
|---------------------|---------|----------|
| - <b>For adults</b> | Fare    | Distance |
|                     | Rs. 500 | >=1500   |

And fare get reduced by 25% if distance is < 1500.

- **For Children**

For every child a fixed Rs. 50 is charged as fare.

Public members:

- A constructor which initialized initialize all data members with 0
- Function EnterTour() to input the values of the data members tcode, adults, children and call to AssignFare function.
- Function ShowTour() to print all the details of object of Travel type.

```
sol class tour
{
    int tcode,adults,children,distance; float totalfare;
    void assignfare()
    {
        float cfare=50, afare=1500;
        if(distance<1500)
            afare=afare- (afare*25/100);
        totalfare=(children*cfare)+(adults*afare);
    }
public:
    travel()
    {
        tcode=adults=children=distance=totalfare=0; }
    void entertour()
    {
        do
        {
            cout<<"Enter tcode between 6-10 ";
            cin>>tcode;
            if (tcode<6 || tcode>10)
                cout<<"Invalid tcode "<<endl;
        }while(tcode<6 || tcode>10);
    }
};
```

```

        cout<<"Enter children, adults, distance";
        cin>>children>>adults>>distance;
        assignfare();
    }
    void showtour()
    {
        cout<<"tcode:"<<tcode<<endl;
        cout<<"children:"<<children<<endl;
        cout<<"adults :"<<adults<<endl;
        cout<<"distance:"<<distance<<endl;
        cout<<"total fare:"<<totalfare<<endl;
    }
};

```

20.

Define a class named Admission in C++ with following description?

4

**Private members:**

admno            integer (Ranges 10-1500)  
name             string of 20 characters  
cls              integer  
fees             float

**Public members:**

A constructor which initialized admno with 10, name with "NULL", cls with 0 & fees with 0

Function getdata() to read the object of Admission type.

Function putdata() to print the details of object of admission type.

Function draw\_nos() to generate the admission no. randomly to match with admno and display the detail of object.

```

Sol class admission
{
    int admno;
    char name[20];
    int cls;
    float fees;
public:
    admission()
{
    admno=10;
    strcpy(name, "NULL");
    cls=0;
    fees=0;
}
void getdata()
{
    do
    {
        cout<<"Enter admno between 10-1500 ";
        cin>>admn
        if (admno<10 || admno>1500)
            cout<<"Invalid admission no !"<<endl;
    }while(admno<10 ||admno>1500);
    cout<<"Enter name ";
    gets(name);
    cout<<"Enter class and fees ";
    cin>>cls>>fees;
}
}

```

```
void putdata()
{
    cout<<"Admno : "<<admno<<endl;
    cout<<"Name   : "<<name<<endl;
    cout<<"Class  : "<<cls<<endl;
    cout<<"Fees   : "<<fees<<endl;
}
void draw_nos()
{
    int num;
    randomize();
    num=random(1491)+10;
    if (num==admno)
        putdata();
}
};
```

## Inheritance

21. Answer the question (i) to (iv) based on the following:

```
class Exterior
{
int OrderId;
char Address[20];
protected:
float Advance;
public:
Exterior();
void Book();
void View();
};
class Paint:public Exterior
{
int WallArea,ColorCode;
protected:
char Type;
public:
Paint() ;
void PBook();
void PView();
};
class Bill:public Paint
{
float Charges;
void Calculate();
public:
Bill() ;
void Billing() ;
void Print() ;
};
```

(i) Which type of Inheritance out of the following is illustrated in the above example?

- Single Level Inheritance
- Multi Level Inheritance
- Multiple Inheritance

(ii) Write the names of all the data members, which are directly

accessible from the member functions of class Paint.

(iii) Write the names of all the member functions, which are directly accessible from an object of class Bill.

iv) What will be the order of execution of the constructors, when an object of class Bill is declared?

Ans.

- (i) Multi Level Inheritance
- (ii) WallArea, ColorCode, Type, Advance
- (iii) Billing(), Print(), PBook(), PView(), Book(), View()

(iv) Exterior(), Paint(), Bill()

22. Answer the questions (i) to (iv) based on the following:

```
class Interior { int OrderId; char Address[20];
protected: float Advance;
public: Interior(); void Book(); void View();
};
class Painting:public Interior
{ int WallArea,ColorCode;
protected:
char Type; public:
Painting();
void PBook();
void PView(); };
class Billing : public Painting
{ float Charges;
void Calculate();
public:
Billing();
void Bill();
void BillPrint(); };
```

(i) Which type of Inheritance out of the following is illustrated in the above example ?

- Single Level Inheritance
- Multi Level Inheritance
- Multiple Inheritance

(ii) Write the names of all the data members, which are directly accessible from the member functions of class Painting.

(iii) Write the names of all the member functions, which are directly accessible from an object of class Billing.

(iv) What will be the order of execution of the constructors, when an object of class Billing is declared ?

22.

- Ans. (i) Multi Level Inheritance  
(ii) WallArea, ColorCode, Type, Advance  
(iii) Bill(), BillPrint(), PBook(), PView(), Book(), View()  
(iv) Interior, Painting, Billing

23. Consider the following C++ code and answer the questions from (i) to (iv) :

```
class University { long Id; char City[20];
protected: char Country[20]; public: University(); void Register(
); void Display( ); };
class Department: private University { long DCode[10]; char
HOD[20];
protected:
double Budget; public: Department();
void Enter();
void Show(); };
class Student: public Department { long RollNo; char Name[20];
public:
Student();
```

```
void Enroll();  
void View(); };
```

(i) Which type of Inheritance is shown in the above example ?

(ii) Write the names of those member functions, which are directly accessed from the objects of class Student.

(iii) Write the names of those data members, which can be directly accessible from the member functions of class Student.

(iv) Is it possible to directly call function Display( ) of class University from an object of class Department ? (Answer as Yes or No).

23.

Ans. (i) Multi Level Inheritance

(ii) Enroll(), View(), Enter(), Show()

(iii) RollNo, Budget

(iv) No, it is not possible because class Department is inheriting from class University privately. So all public and protected members of class University will become private and hence cannot be accessed by objects.

24. Consider the following C++ code and answer the questions from (i) to (iv):

```
class Campus  
{  
long Id;  
char City[20];  
protected:  
char Country [20] ;  
public :  
Campus();  
void Register();  
void Display() ;  
};
```

```
class Dept : private Campus  
{  
long DCode [10] ;  
char HOD [20] ;  
protected :  
double Budget;  
public:  
Dept() ;  
void Enter();  
void Show();  
};
```

```
class Applicant: public Dept  
{ long RegNo;  
char Name [20] ;  
public:  
Applicant() ;
```

```
void Enroll();
void View();
};
```

- (i) Which type of Inheritance is shown in the above example ?  
(ii) Write the names of those member functions, which are directly accessed from the objects of class Applicant.  
(iii) Write the names of those data members, which can be directly accessible from the member functions of class Applicant.  
(iv) Is it possible to directly call function Display( ) of class Campus from an object of class Dept ? (Answer as Yes or No).

24.

Ans.

- (i) Multi Level Inheritance  
(ii) Enroll(), View(), Enter(), Show()  
(iii) RollNo, Name, Budget  
(iv) Yes, it is possible as it is inherited publicly.

25. Consider the following C++ code and answer the questions from (i) to (iv) :

```
class Student
{
    int Class, Rno;

    char Section;
    protected :
    char SName[20];
    public:
    Student();
    void Stentry();
    void Stdisplay();
};
class Score: private Student
{
    float Marks[S];
    protected:
    char Grade[S];
    public:
    Score ();
    void Sentry();
    void Sdisplay() ;
};
class Report: public Score
{ float Total, Avg;
```



```

public:
    char OverallGrade, Remarks [20];
    Report();
    void REvaluate();
    void RPrint();
};

```

- (i) Which type of Inheritance is shown in the above example?
- (ii) Write the names of those data members, which can be directly accessed from the objects of class Report.
- (iii) Write the names of those member functions, which can be directly accessed from the objects of class Report.
- (iv) Write the names of those data members, which can be directly accessed from the Sentry() function of class Score.

25.

Ans.

- (i) Multi Level Inheritance
- (ii) OverallGrade,Remarks[20];
- (iii) Revaluate(),RPrint(),Sentry(),Sdisplay();
- (iv) Marks[5],Grade[5],SName[20];

26. **Consider the following c++ code and answer the questions from (i) to (iv):**

```

class Personal
{
    int Class,Rno;
    char Section;
protected:
    char Name[20];
public:
    personal();
    void pentry();
    void Pdisplay();
};
class Marks: private Personal
{ float M[5];
    protected:
        char Grade[5];
    public:
        Marks(); void Mentry (); void Mdisplay();
};
class Result: public Marks
{ float Total, Agg;

```

```

public:
char FinalGrade, Comments[20];
Result();
void Rcalculate();
void Rdisplay();
};

```

- (i) Which type of Inheritance is shown in the above example?
- (ii) Write the names of those data members, which can be directly accessed from the objects of class Result.
- (iii) Write the names of those member functions, which can be directly accessed from the objects of class Result.
- (iv) Write the names of those data members, which can be directly accessed from the Mentry() function of class Marks.

26.

Ans.

- (i) Multi Level Inheritance
- (ii) FinalGrade,Comments[20];
- (iii) Rcalculate(),Rdisplay(),Mentry(),Mdisplay();
- (iv) M[5],Grade[5],Name[20];

27. Answer the questions (i) to (iv) based on the following: .

```

class COMPANY
{ char Location[20];
double Budget,Income;
protected:
void Accounts ();
public: COMPANY();
void Register ();
void Show();
};
class FACTORY: public COMPANY
{ char Location [20];
int Workers;
protected:
double Salary;
void Computer ();
public:
FACTORY ();
void Enter ();
void Show();
};

```

```

class SHOP: private COMPANY
{ char Location[20]; float Area; double Sale;

public: SHOP();
void Input();
void Output ();

};

```

- (i) Name the type of inheritance illustrated in the above C++ code.
- (ii) Write the name of data members, which are accessible from member functions of class SHOP.
- (iii) Write the names of all the member functions, which are accessible from objects belonging to class FACTORY.
- (iv) Write the names of all the members, which are accessible from objects of class SHOP.

27.

Ans.

- (i) Hierarchical Inheritance
- (ii) location, area, sale
- (iii) Enter(), Show(), Register (), Show();
- (iv) No Data Member, but Member functions are: Input(), Output()

28. Answer the questions (i) to (iv) based on the following:

```

class Chairperson
{
long CID; //Chairperson Identification
Number
char CName[20];
protected:
char Description [40];
void Allocate();
public:
Chairperson();
void Assign();
void Show();
};
class Director
{
int DID; //Director ID
char Dname[20];
protected:
char Profile[30];
public:
Director();

```

```

void Input();
void output();
};
class Company:private Chairperson, public Director
{
int CID; //Company ID
char City[20], Country[20];
public:
Company();
void Enter();
void Display();
};

```

**(i)** Which type of inheritance out of the following is specifically is illustrated in the above C++ code?

- (a) Single Level Inheritance
- (b) Multi Level Inheritance
- (c) Multiple Inheritance

**(ii)** Write the names of data members, which are accessible by objects of class type Company.

**(iii)** Write the names of all member functions, which are accessible by objects of class type Company.

**(iv)** Write the names of all members, which are accessible from member functions of class Director.

**28.**

Ans.

- (i) Multiple Inheritance
- (ii) None
- (iii) Enter(), Display(), Input(), output()
- (iv) Input(), output(), Profile, Dname, DID

29. Answer the questions (i) to (iv) based on the following:  
class Director

```

{
long DID; //Director Identification Number
char Name[20];
protected:
char Description[40];
void Allocate () ;
public:
Director() ;
void Assign () ;
void Show () ;
} ;
class Ractory:public Director
{
int FID; //Factory ID
char Address[20];
protected:

```

```

int NOE; //No. of Employees
public:
Factory();
void Input ();
void Output ();
};
class ShowRoom:private Factory
{
int SID; //Showroom ID
char City[20];
public:
ShowRoom();
void Enter ();
void Display ();
};

```

(i) Which type of inheritance out of the following is illustrated in the above C++ code?

- (a) Single Level Inheritance
- (b) Multi Level Inheritance
- (c) Multiple Inheritance

(ii) Write the names of data members, which are accessible by objects of class type ShowRoom.

(iii) Write the names of all member functions which are accessible by objects of class type ShowRoom.

(iv) Write the names of all members, which are accessible from member functions of class Factory.

29.

Ans.

- (i) Multilevel Inheritance
- (ii) None
- (iii) Enter(), Display()
- (iv) FID, Address, NOE, Description, Input(), Output(), Assign(), Show(), Allocate()

30. Answer the questions (i) to (iv) based on the following:

```

class FaceToFace
{
char CenterCode [10] ;
public:
void Input ( ) ;
void Output ( ) ;
} ;
class Online
{
char website [50] ;
public:
void SiteIn ( ) ;
void SiteOut ( ) ;
} ;
class Training: public FaceToFace, private Online

```

```

{
long Tcode ;
float charge;
int period;
public:
void Register ( ) ;
void Show ( ) ;
} ;

```

- (i) Which type of Inheritance is shown in the above example?  
ii) Write names of all the member functions accessible from Show( ) function of class Training.  
iii) Write name of all the members accessible through an object of class Training.  
iv) Is the function Output( ) accessible inside the function SiteOut( )? Justify your answer.

30.

Ans.

- (i) Multiple Inheritance
- (ii) Register( ), SiteIn( ), SiteOut( ), Input( ), Output( )
- (iii) Register( ), Show( ), Input( ), Output( )
- (iv) No, function Output( ) is not accessible inside the function SiteOut( ), because Output( ) is a member of class FaceToFace and SiteOut( ) is a member of class Online and the classes FaceToFace and Online are two independent classes.

31. Answer the questions (i) to (iv) based on the following:

```

class PUBLISHER
{
    char Pub[12];
double Turnover;
protected:
void Register();
public:
PUBLISHER();
void Enter();
void Display();
};
class BRANCH
{
    char CITY[20];
protected:
float Employees
public:
BRANCH();
void Haveit();
void Giveit(); };

class AUTHOR : private BRANCH , public PUBLISHER
{
    int Acode;

```

```

char Aname[20];
float Amount;
public:
AUTHOR();
void Start();
void Show();
};

```

(i) Write the names of data members, which are accessible from objects belonging to class AUTHOR.

(ii) Write the names of all the member functions which are accessible from objects belonging to class BRANCH.

(iii) Write the names of all the members which are accessible from member functions of class AUTHOR.

(iv) How many bytes will be required by an object belonging to class AUTHOR?

**31.**

Ans.

(i) None of data members are accessible from objects belonging to class AUTHOR.

(ii) Haveit(), Giveit()

(iii) Data members : Employees, Acode, Aname, Amount

Member function : Register(), Enter(), Display(), Haveit(), Giveit(), Start(), Show(),

(iv) 70

32. Answer the questions (i) to (iv) based on the following code:

```

class Dolls
{
    char DCode[5];
protected:
float Price ;
void CalcPrice(float);
public:
Dolls( );
void DInput( );
void DShow( );
};
class SoftDolls: public Dolls
{
    char SDName[20];
float Weight;
public:
SoftDolls( );
void SDInput( );
void SDSHOW( );
};
class ElectronicDolls: public Dolls
{
    char EDName[20];
char BatteryType[10];
int Battieries;
public:

```

```
ElectronicDolls ( );  
void EDInput( );  
void EDSHOW( );  
};
```

- (i) Which type of Inheritance is shown in the above example?
- (ii) How many bytes will be required by an object of the class ElectronicDolls?
- (iii) Write name of all the data members accessible from member functions of the class SoftDolls.
- (iv) Write name of all the member functions accessible by an object.

**32.**

**Ans.**

- (i) Hierarchical Inheritance OR Single Level Inheritance**
- (ii) 41 bytes**
- (iii) SDName, Weight, Price**
- (iv) EDInput(), EDSHOW(), DInput(), DSHOW()**

33. consider the following class declaration and answer the question below :

```
class university  
{  
    int noc;  
protected:  
char uname[25];  
public:  
university();  
char state[25];  
void enterdata();  
void displaydata();  
};  
class college : public university  
{  
    int nod;  
char cname[25];  
protected:  
void affiliation();  
public:  
college();  
void enrol(int ,int);  
void show();  
};  
class department : public college  
{  
    char dname[25];  
int nof;  
public:  
department();  
void display();  
void input();  
};
```



- (i) Which class's constructor will be called first at the time of declaration of an object of class department?
- (ii) How many bytes does an object belonging to class department require?
- (iii) Name the member function(s), which are accessed from the object of class department.
- (iv) Name the data member, which are accessible from the object of class college.

33.

**Ans.**

- (i) Constructor of University Class ( Top most Base class)**
- (ii) 106 bytes**
- (iii) display(), input(), enrol(int,int), show(), enterdata(), displaydata()**
- (iv) state**

34. Answer the questions(i) to (iv) based on the following :

```

class cloth
{
    char category[5];
    char description[25];
protected:
    float price;
public:
    void Entercloth( );
    void dispcloth( );
};

class Design : protected cloth
{
    char design[21];
protected:
    float cost_of_cloth;
public:
    int design_code;
    Design( );
    void Enterdesign( );
    void dispdesign( );
};

class costing : public cloth
{
    float designfee;
    float stitching;
    float cal_cp( );
protected:
    float costprice;
    float sellprice;
public:
    void Entercost( );
    void dispcost( );
    costing ( ) { };
};

```

```
};
```

(i) Write the names of data members which are accessible from objects belonging to class cloth.

(ii) Write the names of all the members which are accessible from objects belonging to class Design.

(iii) Write the names of all the data members which are accessible from member functions of class costing.

(iv) How many bytes will be required by an object belonging to class Design?

#### **34.ANS**

**(i) None of the data members**

**(ii) void Enterdesign( ), void dispdesign( )**

**(iii) price, cost\_of\_cloth, design\_code, designfee, stiching, costprice, sellprice;**

**(iv) 61 bytes**

35. Answer the questions(i) to (iv) based on the following :

```
class Regular
```

```
{          char SchoolCode[10];
```

```
public:
```

```
void InRegular( );
```

```
void OutRegular( );
```

```
};
```

```
class Distance
```

```
{          char StudyCentreCode[5];
```

```
public:
```

```
void InDistance( );
```

```
void OutDistance( );
```

```
};
```

```
class Course : public Regular, private Distance
```

```
{          char Code[5];
```

```
float Fees;
```

```
int Duration;
```

```
public:
```

```
void InCourse( );
```

```
void OutCourse( );
```

```
};
```

(i) Which type of Inheritance is shown in the above example?

(ii) Write names of all the member functions accessible from OutCourse function of class Course.

(iii) Write name of all the members accessible through an object of the Class Course.

(iv) Is the function InRegular( ) accessible inside the function InDistance ( )? Justify your answer.

#### **35. ANS**

**(i) Multiple Inheritance**

- (ii) InCourse( ), InDistance( ), OutDistance( ), InRegular( ), OutRegular( )
- (iii) InCourse( ), OutCourse( ), InRegular( ), OutRegular( )
- (iv) Yes, It can be accessed by using the object because it is a public member.

36. Consider the following declarations and answer the questions given below :

```
class living_being
{   char name[20];
protected:
    int jaws;
public:
    void inputdata(char, int);
    void outputdata();
}
class animal : protected living_being
{   int tail;
protected:
    int legs;
public:
    void readdata(int, int);
    void writedata();
};
```

```
class cow : private animal
{   char horn_size;
public:
    void fetchdata(char);
    void displaydata();
};
```

- (i) Name the base class and derived class of the class animal.
- (ii) Name the data member(s) that can be accessed from function displaydata.
- (iii) Name the data member(s) that can be accessed by an object of cow class.
- (iv) Is the member function outputdata accessible to the objects of animal class.

**36. Ans**

- (i) **Base class : living\_being      Derived class : cow**
- (ii) **horn\_size, legs, jaws**
- (iii) **etchdata() and displaydata()**
- (iv) **No**

37. Consider the following and answer the questions given below:

```
class MNC
{
char Cname[25]; // Company name
```

```

protected :
char Hoffice[25]; // Head office
public :
MNC( );
char Country[25];
void EnterDate( );
void DisplayData( );
};
class Branch : public MNC
{
    long NOE; // Number of employees
char Ctry[25]; // Country
protected:
void Association( );
public :
Branch( );
void Add( );
void Show( );
};
class Outlet : public Branch
{
char State[25];
public :
Outlet();
void Enter();
void Output();
};

```

- (i) Which class's constructor will be called first at the time of declaration of an object of class Outlet?
- (ii) How many bytes an object belonging to class Outlet require ?
- (iii) Name the member function(s), which are accessed from the object(s) of class Outlet.
- (iv) Name the data member(s), which are accessible from the object(s) of class Branch.

**ANS 37.**

- (i) **class MNC**
- (ii) **129**
- (iii) **void Enter(), void Output(), void Add(), void Show(), void EnterDate(), void DisplayData().**
- (iv) **char country[25]**

## **FILE HANDLING 1 MARK MISSING STATEMENT QUESTIONS**

Q1 Observe the program segment given below carefully and fill the blanks marked as Statement performing the required task. #include<fstream.h>

```

class PRODUCT
{int Pno; char Pname[20]; int Qty;
public :
void ModifyQty( ) ; // The function is to modify quantity of
a PRODUCT
} ;
void PRODUCT: :ModifyQty ( )
{ fstream File ;
File.open ("PRODUCT.DAT", ios::binary |ios :: in| ios::out) ;
int MPno;
cout<<"Product No to modify quantity : ";
cin>>MPNo;
while (File.read ((char*) this, sizeof(PRODUCT))
{ if (MPno == Pno)
{ cout<<"Present Quantity:"<<Qty<<endl ;
cout<<"Changed Quantity:";cin>>Qty ;
int Position = _____; //Statement 1
_____ ; // Statement 2
File.write ((char*) this, sizeof (PRODUCT)) ; //Re-writing
the record
} }
File.close ( ) ;
}
Ans 1 : Statement 1: File.tellg ( ) ;
Statement 2: File.seekg (-sizeof (PRODUCT), ios::cur));

```

2. Find the output of the following C++ code considering that the binary file MEMBER.DAT exists on the hard disk with records of 100 members:

```

class MEMBER
{
int Mno; char Name[20];
public:
void In();void Out();
};
void main()
{ fstream MF;
MF.open("MEMBER.DAT",ios::binary|ios::in);
MEMBER M;
MF.read((char*)&M,sizeof(M));
MF.read((char*)&M,sizeof(M));
MF.read((char*)&M,sizeof(M));
int POSITION=MF.tellg()/sizeof(M);
cout<<"PRESENT RECORD:"<<POSITION<<endl;
MF.close(); }

```

Ans 2: PRESENT RECORD: 3

3. Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using tellg() and seekp() functions for performing the required task.

```
#include <fstream.h>
```

```

class Client
{
long Cno;
charName[20],Email[30] ;
public:
//Function to allow user to enter
//the Cno, Name,Email
void Enter() ;
//Function to allow user to enter
//(modify) Email
void Modify() ;
long ReturnCno()
{
return Cno;
}
};
void ChangeEmail()
{
Client C;
fstream F;
F.open ("INFO.DAT",ios::binary | ios::in | ios::out);
long Cnoc; //Client's no. whose Email needs to be changed
cin>>Cnoc;
while (F.read((char*)&C,
sizeof(C))
{
if (Cnoc= =C.ReturnCno())
{
C.Modify(); //Statement 1
int Pos = _____
//To find the current position
//of file pointer
_____ // Statement 2
//To move the file pointer to write the modified record back onto the file for the desired
Cno
F.write((char*)&C, sizeof(C));
}
}
F.close();
}

```

Ans 3: .Statement 1: F. tellg ( );  
Statement 2: F. seekp(Pos-sizeof(C)) ;  
OR  
F.seekp(-sizeof(C), ios::cur);

4. Observe the program segment given below carefully and fill in the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task.

```
#include <fstream.h>
class Stock
{
long Ino ; //Item Number
char Item [20] ; //Item Name
int Qty ; //Quantity
public:
void Get(int);
//Function to enter the content
void show( );
//Function to display the content
void Purchase (int Tqty)
{
Qty + = Tqty ;
} //Function to increment in Qty
long KnowIno ( )
{
return Ino;
}
};
void Purchaseitem(long PINo, int PQty)
//PINo -> Ino of the item purchased
//PQty -> Number of item purchased
{f
stream File;
File.open("ITEMS.DAT", ios ::binarylios ::inlios :: out);
int Pos = -1 ;
Stock S ;
while (Pos == -1 && File.read((char*) &S,sizeof (S)))
if (S. KnowIno( ) ==PINo)
{
S. Purchase (PQty);
//To update the number of Items
Pos = File.tellg ( ) -sizeof (S) ;
_____ ;
//Line 1: To place the file
//pointer to the required position
_____ ;
//Line 2: To write the object s on to
//the binary file
}i
f (Pos == -1)
cout<<"No updation done as
required Ino not found.." ;
File.close ( ) ;

}
```

Ans 4: 44. Statement 1:

File.seekp(Pos);

OR

File.seekp(-sizeof(A), ios:: cur);

Statement 2:

```
File.write((char*)&S, sizeof(S));  
OR  
File.write((char*)&S, sizeof(Stock));
```

5. Observe the program segment given below carefully, and answer the question that follows  
class candidate

```
{ long Cid ; // Candidate's Id  
char CName[20]; // Candidate's Name  
float Marks ; // Candidate's Marks  
public ;  
void Enter( ) ;  
void Display( ) ;  
void MarksChange( ) ;  
//Function to change marks  
long R_Cid( )  
{ return Cid;  
}  
};  
void MarksUpdate (long Id)  
{  
fstream File ;  
File.open ("CANDIDATE.DAT", ios ::binary|ios::in|ios :: out) ;  
Candidate C ;  
int Record = 0, Found = 0 ;  
while (!Found&&File.read((char*)&C,sizeof(C)))  
{  
if (Id = =C.R_Cid( ))  
{ cout << "Enter new Marks" ;  
C.MarksChange( ) ;  
_____ //Statement1  
_____ //Statement 2  
Found = 1 ;  
}  
Record++ ;  
}  
if (Found = = 1)  
cout << " Record Updated" ;  
File.close( ) ;  
}
```

Write the Statement to position the File Pointer at the beginning of the Record for which the Candidate's Id matches with the argument passed, and Statement 2 to write the updated Record at that position.

Ans 5: . Statement 1

```
File.seekp(File.tellp( )-sizeof(C));
```

Or

```
File.seekp(Record*sizeof(C));
```

Statement 2

```
File.write((char*)&C,sizeof(C));
```

Or

```
File.write((char*)&C,sizeof(Candidate));
```



6. Fill in the blanks marked as Statement 1 and Statement 2 in the program segment given below with appropriate functions for the required task.

```

class Club
{
    long int Mno ;           //Member number
    char Mname [20] ;       //Member name
    char Email [30] ;       //Email of member
public:
    void Register ( ) ;     //Function to register member
    void Disp ( ) ;        //Function to display details
    void ChangeEmail ( )    //Function to change Email
    {
        cout<< "Enter Changed Email:";
    }
    long int GetMno ( )
    {
        Return Mno ;
    }
};
void ModifyData ( )
{
    fstream File ;
    File.open ("CLUB DAT".ios: :binary | ios : : out);
    int Modify = 0. Position;
    long int ModiMno;
    cout<< "Mno-whose email required to modified:";
    cin>>ModiMno;
    Club CL;
    while(!Modify&&File.read((char*)&CL,sizeof(CL)))
    {
        If(CL.GetMno( ) == ModiMno)
        {
            CL.ChangeEmail ( );
            Position = File.tellg( )-sizeof(CL);
            //Statement 1: To place file pointer to the required position
            _____;
        }
    }
    //Statement 2: To write the object CL onto the binary file
    _____;
    Modify++;
}
}
If (Modify)
    cout<< "Email Changed. . ."<<end];
else
    cout<< "Member not found. . ."<<end];

```

```

        File.close( );
    }

```

Ans 6: . Statement 1

```
File.seekp(Position)
```

Statement 2

```
File.write((char*)&CL,sizeof(CL)
```

47. Observe the program segment given below carefully and answer the questions that follow:

```
class Stock
```

```

{
int Ino,Qty; char Item[20];
public:
void Enter() {cin>>Ino;gets(Item); cin>>Qty;}
void Issue(int Q) { Qty+=Q}
void Purchase(int Q) { Qty-=Q}
int GetIno{return Ino;}
};
void Purchaseitem(int Pino, int PQty)
{
fstream file;
File.open("STOCK.DAT",ios::binary|ios::in|ios::out);
Stock S;
int Success=0;
while (Success==0 && File.read((char*)&S, sizeof(S)))
{
if (Pino==S.GetIno())
{
S.Purchase(PQty);
_____//Statement 1
_____//statement 2
Success++;
}
}
if (Success==1)
cout<<"Purchase Updated"<<endl;
else
cout<<"Wrong Item No"<<endl;
File.close( );
}

```

(i) Write statement 1 to position the file pointer to the appropriate place, so that the data updation is

done for the required item.

(ii) Write statement 2 to perform the write operation so that the updation is done in the binary file.

Ans 7: . Statement 1 - File.seekp(Success);

Statement 2 - File.write((char\*) &S, sizeof(S)

8. Observe the program segment given below carefully and fill the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task.

```
#include <fstream.h>
```

```
class Library
```

```
{
```

```
long Ano; _____ //Ano - Accession Number of the Book
```

```

char Title[20]; //Title - Title of the Book
int Qty; //Qty - Number of Books in Library
public:
void Enter (int); //Function to enter the content
void Display(); //Function to display the content
void Buy(int Tqty)
{
Qty+=Tqty;
} //Function to increment in Qty
long GetAno( )
{
return Ano;
}
};
void BuyBook(long BANO,int BQty) //BANO ->Ano of the book purchased
//BQty ->Number of books purchased
{ fstream File;
File.open("STOCK.DAT" ,ios::binary|ios::in|ios::out);
int position=-1;
Library L;
while(Position!=-1 &&File.read((char*)&L,sizeof(L)))
if (L.GetAno()==BANO)
{
L.Buy(BQty);
//To update the number of Books
Position = File.tellg()-sizeof(L) ;
_____ ;
//Line 1: To place the file pointer to the required position
_____ ;
//Line 2:To write the object L on to the binary file
} if (Position!=-1)
cout<< "No updation do:re as
required Ano not found..";
File.close( );
}

```

Ans 8: . Statement 1

```
File.seekp(Position);
```

OR

```
File. seekp (-sizeof (L), ios::cur);
```

Statement 2

```
File.write((char*)&L, sizeof(L));
```

OR

```
File.write((char*)&L,sizeof(Library));
```

9. Observe the program segment given below carefully, and answer the question that follows:

```
class Labrecord
```

```
{ int Expno;
```

```
char Experiment[20] ;
```

```

char Checked ;
int Marks ;
public :
void EnterExp( ) ;
//function to enter Experiment details
void ShowExp( ) ;
//function to display Experiment details
char RChecked( )
//function to return Expno
{
return Checked;
}
void Assignmarks (int M)
//function to assign Marks
{
Marks = M;
}
};
void ModifyMarks( )
{
fstream File ;
File.open ("Marks.Dat", ios :: binary | ios :: in | ios :: out) ;
Labrecord L ;
int Rec=0 ;
while (File.read ( (char*) &L,sizeof (L)))
{
if (L.RChecked( )= ='N')
L.Assignmarks(0)
else
L.Assignmarks (10)
_____ ; //Statement 1
_____ ;//Statement 2
Rec++ ;
}
File.close( ) ;
}

```

If the function ModifyMarks ( ) is supposed to modify marks for the records in the file MARKS.DAT based on their status of the member Checked (containing value either 'Y' or 'N'). Write C++ statements for the statement 1 and statement 2, where, statement 1 is required to position the file write pointer to an appropriate place in the file and statement 2 is to perform the write operation with the modified record.

Ans 9: . Statement 1

```
File.seekp(File.tellp( )-sizeof(L));
```

or

```
File.seekp(Rec*sizeof(L));
```

Statement 2

```
File.write((char*)&L,sizeof(L));
```

or

```
File.write((char*)&L,sizeof(Labrecord));
```

10. Observe the program segment given below carefully , and answer the question that follows :

```
class Member
{
int Member_no ;
char Member_name[20] ;
public :
void enterdetails ( ) ; //function to enter Member details
void showdetails ( ) ; //function to display Member details
int RMember_no( )
{
return Member_no;
} //function to return Member_no
};
void Update (Member NEW)
{
fstream File ;
File.open("MEMBER.DAT" , ios ::
binary | ios :: in | ios :: out) ;
Member OM ;
int Recordsread = 0, Found = 0 ;
while (!Found && File.read((char*)& OM, sizeof(OM)))
{
Recordsread++ ;
if (NEW.RMember_no( ) ==OM.RMember_no( ))
{
_____ //Missing Statement
File.write((char*) & NEW ,
sizeof(NEW) ;
Found = 1 ;
}
else
File.write((char*) & OM,
sizeof(OM)) ;
}
if (!Found)
cout<<"Record for modification does
not exist" ;
File.close( ) ;
}
```

If the function Update( ) is supposed to modify a record in file MEMBER.DAT with the values of Member NEW passed to its argument, write the appropriate statement for Missing statement using seekp( ) or seekg( ) , whichever needed, in the above code that would write the modified record at its proper place.

Ans 10: . File.seekp((Recordsread-1)\*sizeof(OM));

OR

File.seekp(Recordsread\*sizeof(OM));

OR

```
File.seekp(-l*sizeof(OM),ios::curr);  
OR  
File.seekp(file.tellg()-sizeof(OM));
```

*Marking scheme : (½ Mark for each correct statement*

## TEXT FILE QUESTIONS

Write a function in a C+ to read the content of a text file "DELHI.TXT" and display all those lines on screen, which are either starting with 'D' or starting with 'M'.

```
void DispDorM()  
{ifstream File("DELHI.TXT")  
char str[80];  
while(File.getline(str,80)  
{if(str[0] == 'D' | str[0] == 'M')  
cout<<str<<endl;  
}  
File.close(); //Ignore  
}
```

Write a function in a C+ to count the number of lowercase alphabets present in a text file "BOOK.txt".

Answer

```
int countalpha()  
{  
ifstream Fin("BOOK.txt");  
char ch;  
int count=0;  
while(!Fin.eof())  
{  
Fin.get(ch);  
if (islower(ch)  
count++;  
}  
Fin.close();  
return count;  
}
```

Assume a text file "cordinate.txt" is already created. Using this file create a C+ function to count the number of words having first character capital.

```
int countword()  
{ ifstream Fin("BOOK.txt");  
char ch[25];  
int count=0;  
while(!Fin.eof())  
{Fin>>ch;  
if (isupper(ch[0])  
count++;  
}
```

```
Fin.close();
return count;
}
```

Function to count number of lines from a text files (a line can have maximum 70 characters or ends at '.')

```
int countword()
{ ifstream Fin("BOOK.txt");
char ch[70];
int count=0;
if (!Fin)
{ cout<<"Error opening file!" ;
exit(0);
}
while(1)
{Fin.getline(ch,70,'. ');
if (Fin.eof())
break;
count++;
}
Fin.close();
return count;
}
```

1.

Write function definition for SUCCESS () in C++ to read the content of a text file STORY.TXT count the presence of word STORY and display the number of occurrence of this word.

Note : The word STORY should be an independent word.

Ignore type cases (i.e. lower/upper case)

```
Ans 1: void SUCCESS()
{
int count=0;
ifstream f("STORY.TXT");
char s[20];
while (!f.eof())
{
f>>s;
if(strcmpi(s,"STORY")==0)
count++;
}
cout<<count;
f.close();
}
```

2.

Write function definition for TOWER() in C++ to read the content of a text file WRITEUP.TXT, count the presence of word TOWER and display the number of occurrences of this word.

Note : - The word TOWER should be an independent word  
- Ignore type cases (i.e. lower/upper case)

Example:

If the content of the file WRITEUP.TXT is as follows:  
Tower of hanoi is an interesting problem. Mobile phone tower is away from here. Views from EIFFEL TOWER are amazing.  
The function TOWER () should display the following: 3

Ans 2:.

```
void TOWER()
{
int count=0;
ifstream f("WRITEUP.TXT");
char s[20];
while (!f.eof())
{
f>>s;
if (strcmpi(s,"TOWER")==0)
count++;
}
cout<<count;
f.close();
}
```

3.

Write a function EUCount() in C++, which should read each character of a text file IMP.TXT, should count and display the occurrence of alphabets E and U (including small cases e and u too).

Example :

If the file content is as follows:

Updated information is simplified by official websites.

The EUCount() function should display the output as:

E:4

U:1

Ans 3: void EUCount()

```
{
ifstream fi("IMP.TXT")
char ch;
int CountE=0,CountU=0;
while(fi)
{
fi.get(ch);
if(ch=='e' || ch=='E') CountE++;
else if(ch=='u' || ch=='U') CountU++;
}
cout<<"E:"<<CountE<<endl;
cout<<"U:"<<CountU;
```



```
    fi.close();
}
```

4.

Write a function AECOUNT() in C++, which should read each character of a text file NOTES.TXT, should count and display the occurrence of alphabets A and E (including small cases a and e too).

Example :

If the file content is as follows :

```
CBSE enhanced its
CCE guidelines further.
```

The AECOUNT() function should display the output as

```
A:1
```

```
E:7
```

Ans 4:

```
void AECOUNT()
{
    ifstream fi("NOTES.TXT")
        char ch;
        int CountA=0,CountE=0;
        while(fi)
        {
            fi.get(ch);
            if(ch=='A' || ch=='a') CountA++;
            else if(ch=='E' || ch=='e') CountE++;
        }
        cout<<"A:"<<CountA<<endl;
        cout<<"E:"<<CountE;
        fi.close();
    }
```

5.

Write a function CountYouMe() in C++ which reads the contents of a text file story.txt and counts the words You and Me (not case sensitive).

For example, if the file contains:

```
You are my best friend.
```

```
You and me make a good team.
```

The function should display the output as

```
Count for You: 2
```

```
Count for Me: 1
```

Ans 5:

```
void CountYouMe()
{
    ifstream Fil;
    Fil.open("STORY.TXT",ios::in);
    char Word [80];
    int C1=0, C2=0;
```

```

while (!Fil.eof())
{
Fil>>Word;
if(strcmp(Word,"You")==0)
C1++;
else if (strcmp(Word,"Me") ==0)
C2++;
}
cout<<"Count for You:"<<C1<<endl;
cout<<"Count for Me:"<<C2<<endl;
fil.close();
}

```

6.

Write a function TotalDigits() in C++ , which reads the contents of the Text File "child.txt" and display the number of digits in it.

If the file contains:

All in all, I would like to be 500 note  
and my elders would be 1000 note.

Then the output should be: 7

Ans 6:.

```

void TotalDigits()
{
ifstream chi("child.txt");
int c1=0;
char ch;
while(chi)
{ chi.get(ch);
if(ch>='0' && ch<='9') c1++;
}
cout<< "no of total digits in file:="<<c1;
chi.close();
}

```

7.

Assuming the class WORKER as declared below, write a function in c++ to read the objects of WORKER from binary file name "WORKER.DAT" and display those records of workers whose wage is less than 300.

```

class WORKER
{ int WNO;char WName[50]; float Wage;
public :
void enter() { cin>>WNO; gets(WName); cin>>Wage;}
void display() { cout<<WNO<<"*"<<WName<<"*"<<Wage<<endl;}
float GetWage() { return Wage;}
};

```

Ans 7: void show()

```

{ ifstream fin("WORKER.DAT",ios::in|ios::binary);
WORKER W;

```

```

while(fin)
    { fin.read((char*)&W,sizeof(W));

        if( W.GetWage(<300)
          { W.display();}
        }
    Fin.close();
}
8.

```

Write a function in a C++ to read the content of a text file "UNO.TXT" and display all those lines on screen, which are either starting with 'D' or starting with 'M'.

Ans 8: void SHOW()

```

{
ifstream File("UNO.TXT")
char str[80];
File.getline(str,80);
while(File)
{
if(str[0] == 'D' || str[0] == 'M')
{ cout<<str<<endl; }
File.getline(str,80);
}
File.close(); //Ignore
}

```

9.

Write a function in C++ to count the words "this" and "these" present in a text file "ARTICLE.TXT".

[Note that the words "this" and "these" are complete words]

Ans 9: void COUNT ( )

```

{ifstream Fil; // ifstream Fil("ARTICLE.TXT");
Fil.open("ARTICLE.TXT");
char Word[80] ,Ch;
int C1 =0, C2 = 0, I=0;
while(Fil.get(Ch))
{ if (Ch!= ' ')
Word[I++] = Ch;
else
{
Word[I] = '\0';
if (strcmp(Word,"this")==0)
C1++;
else if (strcmp(Word,"these")==0)
C2++;
I=0;
}
}
cout<<"Count of -this- in file:"<<C1;
cout<<"Count of -these- in file:"<<C2;
Fil.close( );
}

```

```
}
```

10.

Write a function in C++ to count the words "to" and "the" present in a text file "POEM.TXT".

[Note that the words "to" and "the" are complete words]

Ans 10: void WCount ()

```
{
    ifstream fil("POEM.TXT")
    char word[80];
    int WC=0;
    while( !fil.eof())
    {
        if( (strcmp(word, 'to')==0 )|| (strcmp(word, 'the')==0))
            WC++;
    }
    cout<< WC;
    fil.close();
}
```

11.

Write a function in a C++ to count the number of lowercase alphabets present in a text file "BOOK.txt".

Ans 11: int countalpha()

```
{    ifstream Fin("BOOK.txt");
char ch;
int count=0;
while(!Fin.eof())
{
    Fin.get(ch);
    if (islower(ch))
        count++;
}
    Fin.close();
return count;
}
```

12.

Assume a text file "coordinate.txt" is already created. Using this file create a C++ function to count the number of words having first character capital.

Ans 12:

```
int countword()
{    ifstream Fin("BOOK.txt");
char ch[25];
int count=0;
while(!Fin.eof())
{
    Fin>>ch;
```

```

if (isupper(ch[0]))
count++;
}
Fin.close();
return count;
}

```

13.

Write a function to count the number of blanks present in a text file named "PR.TXT" .

```

Ans 13: void BlanksCount( )
{
ifstream fin("PR.TXT",ios::in);
char ch;
int B=0;
if(!fin)
{ cout<<"No words at all in the file.
So no blank spaces";
exit(0);
}
while(fin)
{
fin.get(ch);
if(ch== ' ')
B++;
}
cout<<"\nTotal number of Blank
Spaces in the file = "<<B;
Fin.close();
}

```

Marking Scheme :

(½ Mark for opening.TXT correctly)  
(½ Mark for reading each word or character or line (using any method) from the file)  
(½ Mark for condition )  
(½ Mark for displaying correctly)

14. Write a program that counts the number of characters up to the first \$ in input and that leaves the \$ in the input stream.

```

Ans. #include<fstream.h>
#include<stdio.h>
#include<iostream.h>
void main(){
char s[80],ch;
int count=0;
ifstream file("abc.txt");
while(!file.eof())

```

```

{ file.getline(s,80);
for(int i=0;i<80;i++)
{ if(s[i]=='$')
break;
count++;
}
};
cout<<count;
file.close();
}

```

15. Write a program that reads a text file and creates another file that is identical except that every sequence of consecutive blank space is replaced by a single space.

```

Ans. #include <fstream.h>
#include <iostream.h>
#include <ctype.h>
#include <conio.h>
void main(){
char ch;
int count=0;
ifstream in_stream;
ofstream out_stream;
clrscr();
in_stream.open("A.txt");
out_stream.open("B.txt");
while (!in_stream.eof())
{
ch = (char)in_stream.get( );
if(isspace(ch))
count++;
if(count >= 2)
{
ch=' ';
count = 0;
}
else
{
out_stream <<ch;
}
}
}

```

16. Write a user defined function in C++ to read the content from a text file NOTES.TXT, count and display the number of blank spaces present in it.

```

Ans. (i) void countspace(){
ifstream fins;
fins.open("NOTES.TXT");

```

```

char ch;
int count=0;
while(!fins.eof())
{
fin.get(ch);
if(ch==' ')
count++;
}
cout<<"Number of blank spaces"<<count;
fin.close();
}

```

17. Write a function in C++ to print the count of the word as an independent word in a text file STORY.TXT.

For example, if the content of the file STORY.TXT is:

There was a monkey in the zoo.

The monkey was very naughty.

Then the output of the program should be 2.

```

Ans. void wordcount(){
ifstream fil("STORY.TXT");
char word[30]; //assuming longest word can be 29 characters
long
int count=0;
while(!fil.eof())
{ cin>>word;
if((strcmp("the",word)==0) && (strcmp("The",word)==0));
count++;
}
fil.close();
cout<<count;
}

```

18. Write a function in C++ to count the number of uppercase alphabets present in a text file "ARTICLE.TXT".

```

Ans. int countupcase(){
ifstream fin("ARTICLE.TXT");
int count=0;
char ch;
while(!fin.eof())
{ fin>>ch;
if(isupper(ch))
count++;
}
fin.close();
return count;
}

```

19. Write a function in C++ to count the number of digits present in a text file "PARA.TXT".

```
Ans. void countdigit(){
ifstream fil("PARA.TXT",ios::in);
int count=0;
char ch=fil.get();
while(!fil.eof())
{ if(isdigit(ch))
count++;
ch=fil.get();
}
cout<<"no of digit: "<<count<<endl;
}
```

20. Write a function in C++ to print the count of the word is an independent word in a text file DIALOGUE.TXT.

For example, if the content of the file DIALOGUE.TXT is:

This is his book. Is this good?

Then the output of the program should be 2.

```
Ans. void wordcount
{ ifstream fin("DIALOGUE.TXT");
char word[10];
int wc=0;
while(!fin.eof())
{ fin>>word;
if((strcmp(word,"Is")==0)|| (strcmp(word,"is")==0))
wc++;
}
cout<<wc;
fin.close();
}
```

21. A file contains a list of telephone numbers in the following form:

Arvind 7258031

Sachin 7259197

Karma 5119812

The names contain only one word the names and telephone numbers are separated by white spaces. Write program to read a file and display its contents in two columns.

```
Ans. #include<fstream.h>
#include<conio.h>
void main(){
ifstream fin;
fin.open("telephone.txt");
char ch;
while(!fin.eof())
{
fin.get(ch);
cout<<ch;
}
}
```



```

fin.close();
getch();
}

```

22. Write a function in C++ to count and display the number of lines starting with alphabet 'A' present in a text file "LINES.TXT".

Example: If the file "LINES.TXT" contains the following lines:

A boy is playing there.

There is a playground.

An aeroplane is in the sky.

Alphabets and numbers are allowed in the password.

The function should display the output as 3.

Ans. void countALines(){

```

ifstream fin("LINES.TXT");

```

```

char str[80];

```

```

int c=0;

```

```

while(!fin.eof())

```

```

{ fin.getline(str,80);

```

```

if(str[0]=='a' || str[0]=='A')

```

```

c++;

```

```

}

```

```

fin.close();

```

```

cout<<"Total lines starting with a/a are: "<<c<<endl;

```

```

}

```

23. Write a function in C++ to count the no of "Me" or "My" words present in a text file "DIARY.TXT".

If the file "DIARY.TXT" content is as follows:

My first book was Me and My family. It gave me chance to be known the world.

The output of the function should be

Count of Me/My in file : 4

Ans. void COUNT( ){

```

ifstream Fil("DIARY. TXT");

```

```

char STR[10];

```

```

int count = 0;

```

```

while(!Fil.eof( ))

```

```

{

```

```

Fil>>STR;

```

```

if(strcmp(STR,"Me")==0 || strcmp(STR,"My")==0)

```

```

count++;

```

```

}

```

```

Cout<<"Count of Me/My in file : "<<count<<endl;

```

```

Fil.close( ); //Ignore

```

```

}

```

24. Write a program that copies one file to another. Has the program to take the file names from the users? Has the program to refuse copy if there already is a file having the target name?

```

Ans. #include<iostream.h>
#include<conio.h>
#include<fstream.h>
#include<stdlib.h>
void main(){
ofstream outfile;
ifstream infile;
char fname1[10],fname2[20];
char ch,uch;
clrscr( );
cout<<"Enter a file name to be copied ";
cin>> fname1;
cout<<"Enter new file name";
cin>>fname2;
infile.open(fname1);
if( infile.fail( ) )
{
cout<< " No such a file Exit";
getch();
exit(1);
}
outfile.open(fname2,ios::noreplace);
if(outfile.fail())
{
cout<<"File Already Exist";
getch();
exit(1);
}
else
{
while(!infile.eof( ))
{
ch = (char)infile.get( );
outfile.put(ch);
}
}
infile.close( );
outfile.close( );
getch( );
}

```

25. Write a program that appends the contents of one file to another. Have the program take the filenames from the user.

```

Ans. #include<iostream.h>
#include<conio.h>
#include<fstream.h>
#include<stdlib.h>
void main(){
ofstream outfile;
ifstream infile;

```

```

char fname1[10],fname2[20];
char ch,uch;
clrscr( );
cout<<"Enter a file name from where to append ";
cin>> fname1;
cout<<"Enter the file name where to append";
cin>>fname2;
infile.open(fname1);
if( infile.fail())
{
cout<< " No such a file Exit";
getch();
exit(1);
}
outfile.open(fname2,ios::app);
while( !infile.eof())
{
ch = (char)infile.get();
outfile.put(ch);
}
infile.close( );
outfile.close( );
getch( );
}

```

26. Write a program that reads character from the keyboard one by one. All lower case characters get store inside the file LOWER, all upper case characters get stored inside the file UPPER and all other characters get stored inside OTHERS.

```

Ans. #include<iostream.h>
#include <ctype.h>
#include<conio.h>
#include <stdio.h>
#include<fstream.h>
void main(){
char c,fname[10];
ofstream filout1,filout2,filout3;
filout1.open("UPPER.txt");
filout2.open("LOWER.txt");
filout3.open("OTHER.txt");
cout<<"Enter contents to store in file (Enter # to stop):\n";
while((c=getchar())!='#')
{
if(isupper(c))
{
filout1<<c;
}
else if(islower(c))
{
filout2<<c;
}
}
}

```

```

}
else
{
filout3<<c;
}
}
filout1.close();
filout2.close();
filout3.close();
getch();
}

```

28. Write a function in C++ to count the words to and the present in a text file "POEM.TXT".

[Note. that the words "to" and "the" are complete words.]

Ans. void COUNT ( )

```

{
ifstream File;
File. open (POEM.TXT);
char Word[80] ;
int C1 = 0, C2 = 0;
while(!File.eof())
{
File>>Word;
if (strcmp (Word, to) ==0)
C1++;
else if (strcmp (Word, the) ==0)
C2++;
}
cout<<"Count of -to- in file:" <<C1;
cout<<"Count of -the- in file:"<<C2;
File.close(); //Ignore
}

```

29. Write a function COUNT\_DO( ) in C++ to count the presence of a word „do" in a text file "MEMO.TXT".

Example : If the content of the file "MEMO.TXT" is as follows:

I will do it, if you

request me to do it.

It would have been done much earlier.

The function COUNT\_DO( ) will display the following message:

Count of -do- in file: 2

Ans. void COUNT\_TO( ){

```

ifstream Fil("MEMO.TXT");
char STR[10];
int c=0;
while(Fil.getline(STR,10,' \'))
{
if (strcmpi(STR, "do") == 0)
C++;
}

```

```

}
Fil.close( );
cout<<"Count to -do- in file: "<<c<<endl;
}

```

### 3 MARKS BINARY FILES

Write a definition for function Economic() in C++ to read each record of a binary file ITEMS.DAT, find and display those items, which costs less than 2500. Assume that the file ITEMS.DAT is created with the help of objects of class ITEMS, which is defined below:

```

class ITEMS
{
int ID;char GIFT[20]; float Cost;
public :
void Get()
{
cin>>CODE;gets(GIFT);cin>>Cost;
}
void See()
{
cout<<ID<<":"<<GIFT<<":"<<Cost<<endl;
}
float GetCost() {return Cost;}.
};

```

```

Ans 1: void Economic()
{
ITEMS I;
ifstream fin("ITEMS.DAT",ios::binary);
while (fin.read((char *)&I,sizeof(I)))
{
if(I.GetCost()<2500)
I.See();
}
fin.close(); }

```

2. Write a definition for function COSTLY() in C++ to read each record of a binary file GIFTS.DAT, find and display those items, which are priced more than 2000. Assume that the file GIFTS.DAT is created with the help of objects of class GIFTS, which is defined below:

```

class GIFTS
{
int CODE; char ITEM[20]; float PRICE;
public:
void Procure()
{
cin>>CODE; gets(ITEM);cin>>PRICE;
}
}

```

```

}
void View()
{
cout<<CODE<<": "<<ITEM<<": "<<PRICE<<endl;
}
float GetPrice() {return PRICE;}
};
Ans 2:.
void COSTLY()
{
    GIFTS G;
ifstream fin("GIFTS.DAT",ios::binary);
while (fin.read((char *)&G,sizeof(G))
{
if(G.GetPrice(>2000)
G.View();
}
fin.close();
}

```

3. Assuming the class GAMES as declared below, write a functions in C++ to read the objects of GAMES from binary file GAMES.DAT and display the details of those GAMES, which are meant for children of Age Range "8 to 13".

```

class GAMES
{
int GameCode;
char GameName [10] ;
char *AgeRange;
public :
void Enter ()
{
cin>>GameCode;
gets (GameName);
gets (AgeRange);}
void Display()
{
cout <<Gamecode<<": "<<GameName<<endl;
cout<<AgeRange<<endl ;
}
Char *AgeR () {return AgeRange; }
};

```

```

Ans 3. void READGAMES ()
{
    GAMES obj;
    ifstream infile("GAMES.DAT");
    while(infile)
    {
        infile.read((char*)&obj, sizeof(obj));
        if(strcmp(obj.AgeR(), "8 to 13")==0)
            obj.Display();
    }
}

```

```

    }
    infile.close();
}

```

4.

Assuming the class TOYS as declared below, write a functions in C++ to read the objects of TOYS from binary file "TOYS.DAT" and display the details of those TOYS, which are meant for children of Age Range "5 to 8".

```

class TOYS
{
int ToyCode;
char ToyName [10] ;
char *AgeRange;
public :
void Enter ()
{
cin>>ToyCode;
gets (ToyName);
gets (AgeRange);}
void Display()
{
cout <<Toycode<<": "<<ToyName<<endl;
cout<<AgeRange<<endl ;
)
Char *WhatAge () {return AgeRange; }
};

```

Ans 4: void READTOYS()

```

{
    TOYS obj;
    ifstream infile("TOYS.DAT");
    while(infile)
    {
        infile.read((char*)&obj,sizeof(obj));
        if(strcmp(obj.WhatAge(),"5 to 8")==0)
        obj.Display();
    }
    infile.close();
}

```

}

5.

Given a binary file GAME.DAT, containing records of the following

structure type  
struct Game

{

```
char GameName[20];
char Participant[10][30];
};
```

Write a function in C++ that would read the contents from the file GAME.DAT and creates a file named BASKET.DAT copying only those records from GAME.DAT where the game name is "Basket Ball".

Ans 5:.

```
void CopyBasket( )
{ Game G;
ifstream fin;
fin.open("GAME.DAT",ios::binary);
ofstream fout;
fout.open("BASKET.DAT",ios::binary);
while(fin.read((char *)&G, sizeof(G)))
{ if(strcmp(G.GameName,"Basket Ball")==0)
fout.write((char *)&G, sizeof(G));
}
```

6.

```
class book
{
int book_no;
char book_name[20];
float price;
public:
void enter_book_Details( )
{
cin>> book_no>> price; gets(book_name); }
void show_book_Details( );
int checkbookno(int bookno)
{
If(book_no==bookno)
Return(0);
Else
Return (1);
};
```

Write a function deleteBook() in C++ that deletes the required book record from the binary file BOOKS.DAT based on book\_no.

Ans 6:

```
void deleteBook(int bookNoToDelete)
{
    ifstream fin;
    ofstream fout;
    book ob;
    fin.open("BOOKS.DAT",ios::in|ios::binary);
    fout.open("temp.dat",ios::out|ios::binary);
    if(!fin||!fout)
    {
        cout<<"File not opened.";
```



```

        getch();
        return;
    }
    while(fin.read((char*)&ob,sizeof(ob)))
    {
        if(ob.checkbookno(bookNoToDelete)==1)
            fout.write((char*)&ob,sizeof(ob));
    }
    fin.close();
    fout.close();
    remove("BOOKS.DAT");
    rename("temp.dat","BOOKS.DAT");
}

```

7. Assuming the class VINTAGE as declared below, write a function in C++ to read the objects of VINTAGE from binary file "VINTAGE.DAT" and display those vintage vehicles, which are priced between 20000 and 250000.

```

class VINTAGE
{
    int VNO; Char VDesc[10]; float Price;
public:
    void GET()
{ cin>>VNO; gets(VDesc);cin>>Price;}
void VIEW()
{
    cout<<VNO<<endl;
    cout<<VDesc<<endl;
    cout<<Price<<endl;}
float ReturnPrice()
{ return Price;}
};

```

Ans 7: void show()

```

{ ifstream fcin("VINTAGE.DAT",ios::in|ios::binary);
VINTAGE V;
float prc;
while ( fcin)
    { fcin.read((char*)&V, sizeof(V));
    prc=V.ReturnPrice();
    if( prc>=20000 & prc<=250000)
        V.VIEW();
}fcin.close();
}

```

8. Assuming the class NETBOOK as declared below, write a function in C++ to read the objects of NETBOOK from binary file "NETBOOK.DAT" and display those netbooks, which are priced between 25000 and 55000.

```

class NETBOOK
{
    int NBID; Char NBDesc[10]; float Price;

```

```

        public:
        void GET()
{ cin>> NETBID; gets(NBDesc);cin>>Price;}
void VIEW()
{
    cout<<NBID<<endl;
    cout<<NBDesc<<endl;
    cout<<Price<<endl;}
float ReturnPrice()
{ return Price;}
};

```

Ans 8: 22.

```

void show()
{ ifstream fcin("NETBOOK.DAT",ios::in|ios::binary);
NETBOOK N;
float prc;
while ( fcin)
    { fcin.read((char*)&N, sizeof(N));
    prc=N.ReturnPrice();
    if( prc>=25000 & prc<=55000)
        N.VIEW();
}fcin.close();
}

```

9. Write a function in C++ to search for the details (Number & calls) of those mobile phones, which have more than 1000 calls from a binary file "mobile.dat". Assuming that this binary file contains records/objects of class mobile, which is defines below:

```

class mobile
{
    char number[10]; int calls;
public:
    void Enter() { gets(number);cin>>calls;}
    void Billing(){cout<<number<<"#"<<calls<<endl;

    int GetCalls() { return calls;}
};

```

Ans 9:

```

void display()
{ mobile M;
    ifstream
fin("mobile.dat",ios::in|ios::binary);
    fin.read((char*)&M, sizeof(M));
    while(fin)
        { if(M.GetCalls()>1000) M.Billing();
        fin.read((char*)&M, sizeof(M));

```

```

}fin.close();
}

```

10. Write a function in C++ to search for a tablet from a binary file "tablet.dat" containing objects of class tablet (defined below). The user should enter the ModelNo and function should search and display the detail of tablet.

```

class tablet
{
    long ModelNo; float RAM, HD;
    char Details[20];
public:
    void Enter(){ cin>>ModelNo>>RAM>>HD; gets(Details);}
    void Disp(){ cout<<ModelNo<<RAM<<HD<<Details<<endl;}
    long Model(){ return ModelNo;}
};

```

Ans 10:

```

void Search()
{
    tablet t;
    long modeln; ifstream fin;
    cout<<"enter the model no. of tablet : ";
    cin>>modeln;
    fin.open("tablet.dat",ios::binary);
    while(fin.read((char*)&t,sizeof(t))
        { if(t.Model()==modeln)
            t.Disp();
        }
    fin.close();
}

```

11. Write a function in C++ to read and display the detail of all the members whose membership type is 'L' or 'M' from a binary file "CLUB.DAT". Assume the binary file "CLUB.DAT" contains objects of class CLUB, which is defined as follows:

```

class CLUB
{
    int Mno; //Member Number
    char Mname [20]; //Member Name
    char Type; //Member Type: L Life Member M
Monthly Member
public:
    void Register (); //Function to enter the
content
    void Display (); // Function to display all
data members
    char WhatType () {return Type;}.
};

```

Ans 11

```
void DisplayDemo ()
{
    CLUB CBJ;
    ifstream fin;
    fin.open ("CLUB.DAT", ios::binary);
    while ( fin.read (char*) &CBJ, sizeof(CBJ) )
        {
            if(CBJ.WhatType()=='L' || 'M' )
                CBJ.Display();
        }
    fin.close();
}
```

12.

Write a function in C++ to search and display details of all flights, whose destination is "Mumbai" from a binary file "FLIGHT.DAT". Assuming the binary file is containing the objects of the following class.

```
class FLIGHT
{ int Fno; //Flight Number
  char From[20]; //Flight Starting Point
  char To[20]; //Flight Destination
public:
  void Enter( )
  {
    cin>>Fno;
    gets(From);
    gets(To);
  }
  char* GetFrom( )
  {return From;}
  char* GetTo( )
  {return To;}

  void Display( )
  {
    cout<<Fno<<": "<<From<<": "<<To<<endl;
  }
};
```

Ans 12:

```
void Read ( )
{
    FLIGHT F;
    ifstream fin;
    fin.open("FLIGHT.DAT",ios::binary);
    //OR ifstream fin ("FLIGHT. DAT", ios: :binary) ;
```

```

while(fin.read((char*)&F,sizeof(F)))
{
if (strcmp(F. GetTo(),"Mumbai"))
F.Display( ) ;
} fin.close(); //
}

```

13. Write a function in C++ to search and display details of all trains, whose destination is "Delhi" from a binary file "TRAIN.DAT" .Assuming the binary file is containing the objects of the following class.

```

class TRAIN
{
int Tno; // Train Number
charFrom[20]; // Train Starting Point
charTo [20]; // Train Destination
public:
char* GetFrom( )
{ return From; }
char* GetTo( )
{ return To;}
void Input( )
{ cin>>Tno; gets(From); gets(To);
}
void Show( )
{
cout<<Tno<<": "<<From<<": "<<To<<endl;
}
};

```

**Ans 13:.**

```

void Read ( )
{
TRAIN T;
ifstream fin;
fin.open("TRAIN.DAT",ios::binary);
//OR ifstream fin ("TRAIN.DAT", ios::binary);
while(fin.read((char*)&T, sizeof(T)))
{
if(strcmp(T.GetTo(),"Delhi")==0)
T.Show( ) ;
} fin.close( );
}

```

Marking Scheme:

*(1Mark for opening .DAT correctly and assigning correct stream)*

*(½ Mark for reading records from .DAT)*

*(½ Mark for comparing Records (ignore case sensitive checking))*

*(1 Mark for displaying record and closing file)*

OR

Any other correct function definition

14. Given a binary file STUDENT.DAT, containing records of the following class Student type

```
class Student
{ char S_Admno[10]; //Admissio number of student
char S_Name[30]; //Name of student
int Percentage; // Marks Percentage of student
public:
void EnterData()
{ gets(S_Admno); gets(S_Name);
cin>>Percentage; }
void DisplayData()
{ cout<<setw(12)<<S_Admno;
cout<<setw(32)<<S_Name;
cout<<setw(3)<<Percentage<<endl;
}
int ReturnPercentage()
{ return Percentage; }
};
```

Write a function in C++, that would read contents of fileSTUDENT.DAT and display the details of those Students whose Percentage is above 75.

```
Ans. void Dispmore75() {
ifstream fin;
fin.open("STUDENT.DAT",ios::in|ios::out|ios::binary);
Student A;
while(!fin.eof())
{ fin.read((char*)&A,sizeof(A));
if(A.ReturnPercentage()>75)
A.DisplayData();
}
fin.close();
}
```

15. Given a binary file SPORTS.DAT, containing records of the following structure type:

```
struct Sports
{ char Event[20];
char Participant[10][30];
};
```

Write a function in C++ that would read contents from the fileSPORTS.DAT and creates a file named ATHLETIC.DAT copying only those records from SPORTS.DATwhere the event name is "Athletics".

```
Ans. void copyfile() {
ifstream fin;
```

```

ofstream fout;
fin.open("SPORTS.DAT",ios::in|ios::binary);
fout.open("ATHELETIC.DAT",ios::out|ios::binary);
Sports s1;
while(!fin.eof())
{ fin.read((char*)&s1,sizeof(s1));
if(strcmp(s1.Event,"Athletics")==0)
fout.write((char*)&s1,sizeof(s1));
}
fin.close();
fout.close();
}

```

16. Write a function in C++ to search and display details. of all trains, whose destination is "Delhi" from a binary file "TRAIN.DAT". Assuming the binary file is containing the objects of the following class.

```

class TRAIN
{
int Tno; // Train Number
char From[20]; // Train Starting Point
char To[20]; // Train Destination
public:
char* GetFrom () {return From;}
char* GetTo () {return To;}
void Input () {cin>>Tno;gets(From);gets(To);}
void Show () {cout<<Tno<<:<<From<<:<<To<<endl;}
};

```

```

Ans. void Read ( )
{
TRAIN T;
ifstream fin;
fin. open (TRAIN.DAT, ios::binary);
while(fin.read((char*)&T, sizeof(T)))
{
if(strcmp(T.GetTo() ,Delhi)==0)
T.Show() ;
}
fin.close(); //Ignore
}

```

17. Given a binary file TELEPHON.DAT, containing records of the following class Directory:

```

class Directory
{ char Name[20];
char Address[30];
char AreaCode[5];
char Phone_No[15];
public:
void Register();

```

```

void Show();
int CheckCode(char AC[])
{ return strcmp(AreaCode,AC); }
};

```

Write a function COPYABC() in C++, that would copy all those records having AreaCode as "123" from TELEPHONE.DAT to TELEBACK.DAT.

```

Ans. void COPYABC() {
ifstream fin("TELEPHON.DAT",ios::in|ios::binary);
ofstream fout("TELEBACK.DAT",ios::out|ios::binary);
Directory ph;
while(!fin.eof())
{ fin.read((char*)&ph,sizeof(ph));
if(ph.checkcode("123")==0
fout.write((char*)&ph,sizeof(ph));
}
fin.close();
fout.close();
}

```

18. Given a binary file CONSUMER.DAT, containing records of the following structure type

```

class Consumer
{ char C_Name[20];
char C_Address[30];
char Area[25];
char C_Phone_No[15];
public:
void Ledger();
void Disp();
int checkCode(char AC[])
{ return strcmp(Area,AC); }
};

```

Write a function COPYAREA() in C++, that would copy all those records having Area as "SOUTH" from CONSUMER.DAT to BACKUP.DAT.

```

Ans. void COPYAREA() {
ifstream fin("CONSUMER.DAT",ios::in|ios::binary);
ofstream fout("BACKUP.DAT",ios::out|ios::binary);
Consumer c;
while(!fin.eof())
{ fin.read((char*)&c,sizeof(c));
if(c.checkcode("SOUTH")==0
fout.write((char*)&c,sizeof(c));
}
fin.close();
fout.close();
}

```

19. Given a binary file GAME.DAT, containing records of the following structure type



```

struct Game
{ char GameName[20];
char Participant[10][30];
};

```

Write a function in C++ that would read contents from the file GAME.DAT and creates a file named BASKET.DAT copying only those records from GAME.DAT where the event name is "Basket Ball".

```

Ans. void CreateNewFile() {
Game g1;
ifstream fin;
ofstream fout;
fin.open("GAME.DAT", ios::in|ios::binary);
fout.open("BASKET.DAT", ios::out|ios::binary);
while(!fin.eof())
{ fin.read((char*)&g1, sizeof(g1));
if(strcmp(g1.GameName, "Basket Ball")==0)
fout.write((char*)&g1, sizeof(g1));
}
fin.close();
fout.close();
}

```

20. Write a function in C++ to read and display the detail of all the users whose status is 'A' (i.e. Active) from a binary file "USER.DAT". Assuming the binary file "USER.DAT" is containing objects of class USER, which is defined as follows:

```

class USER{
int Uid; // User Id
char Uname[20]; // User Name
char Status; // User Type: A Active I Inactive public:
public:
void Register( ); // Function to enter the content
void show( ); // Function to display all data members
char Getstatus( )
{ return Status; }
};

```

```

Ans. void DisplayActive( ) {
USER U;
ifstream fin;
fin.open("USER.DAT", ios:: binary);
while (fin.read( ( char*) &U, sizeof(U)))
{
if (U.Getstatus( ) == 'A')
U.show( );
}
fin.close( ); // Ignore
}

```

21. Write a function in C++ to search for a laptop from a binary file "LAPTOP.DAT" containing the objects of class

LAPTOP (as defined below). The user should enter the Model No and the function should search and display the details of the laptop.

```
class LAPTOP{
long ModelNo;
float RAM,HDD;
char Details[120];
public:
void StockEnter()
{ cin>>Modelno>>RAM>>HDD;
gets(Details);
}
void StockDisplay()
{ cout<<ModelNo<<RAM<<HDD<<Details<<endl;
}
long ReturnModelNo()
{ return ModelNo; }
};
```

```
Ans. void Search( ){
LAPTOP L;
long modelnum;
cin>>modelnum;
ifstream fin;
fin.open("LAPTOP.DAT",ios::binary|ios::in);
while(fin.read((char*)&L,sizeof(L)))
{
if(L.ReturnModelNo( )==modelnum)
L.StockDisplay( );
}
fin.close(); //Ignore
}
```

-----

## STACK AND QUEUE- POSTFIX CONVERSION/EVALUATION

55. Convert the following infix expression to its equivalent postfix expression, showing the stack contents for each step of conversion.

$X / Y + U * (VW)$

Ans 55.  $X / Y + U * (VW) = ((X / Y) + (U * (VW)))$

| Element | Stack | Postfix   |
|---------|-------|-----------|
| (       |       |           |
| (       |       |           |
| X       |       | X         |
| /       | /     | X         |
| Y       | /     | XY        |
| )       |       | XY/       |
| +       | +     | XY/       |
| (       | +     | XY/       |
| U       | +     | XY/U      |
| *       | +     | XY/U      |
| (       | +     | XY/U      |
| V       | +     | XY/UV     |
| -       | +     | XY/UV     |
| W       | +     | XY/UVW    |
| )       | +     | XY/UVW-   |
| )       | +     | XY/UVW-*  |
| )       |       | XY/UVW-*+ |

56. Convert the following infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion.

$U * V + R / (ST)$

ANs

56.

| OR      |       |           |
|---------|-------|-----------|
| Element | Stack | Postfix   |
| U       |       | U         |
| *       | *     | U         |
| V       | *     | UV        |
| +       | +     | UV*       |
| R       | +     | UV*R      |
| /       | +/    | UV*R      |
| (       | +/ (  | UV*R      |
| S       | +/ (  | UV*RS     |
| -       | +/ (- | UV*RS     |
| T       | +/ (- | UV*RST    |
| )       | +/    | UV*RST-   |
|         | +     | UV*RST-/  |
|         |       | UV*RST-/+ |

57.

its

Translate, following infix expression into equivalent postfix expression:  $((A-$

$B) * (D/E)) / (F * G * H)$

Ans 57. Equivalent postfix expression:

$=((A-B)*(D/E))/(F*G*H)$

$$= ((AB-)*(DE/))/(FG*H*)$$

$$= AB - DE /* FG* H*/$$

58. Translate, following infix expression into its equivalent postfix expression:  $A*(B+D)/E-F-(G+H/K)$

Ans 58. Equivalent postfix expression:

$$= A*(B+D)/E-F-(G+H/K)$$

$$= (A*(B+D)/E) - (F - (G + (H/K)))$$

$$= (A*(BD+)/E) - (F - (G + (HK/)))$$

$$= ((ABD+*) / E) - (F - (GHK/+))$$

$$= ABD+* E/F - GHK/+ -$$

59. Write the equivalent infix expression for 10,3,\*,7,1,-,\*,23,+

Ans 59.  $10 * 3 * (7 - 1) + 23$

60. Write the equivalent infix expression for a, b, AND, a, c, AND, OR.

Ans 60. a, b, AND, a, c, AND, OR

(a AND b), (a AND c), OR

(a AND b) OR (a AND c)

61. Evaluate the infix expression.

P: 12 , 7 , 3 , - , / , 2 , 1 , 5 , + , \* , + , )

Ans 61. Symbol Stack

|    |         |
|----|---------|
| 12 | 12      |
| 7  | 12,7    |
| 3  | 12,7,3  |
| -  | 12,4    |
| /  | 3       |
| 2  | 3,2     |
| 1  | 3,2,1   |
| 5  | 3,2,1,5 |
| +  | 3,2,6   |
| *  | 3,12    |
| +  | 15      |
| )  | 15      |

62. Give postfix form of the following expression

$A*(B+(C+D)*(E+F)/G)*H$

Ans 62.  $A*(B+(CD+EF+*)/G)*H$

$A*(B+CD+EF+*G/))*H$

$(A*(BCD+EF+*G/+))H$

$(ABCD+EF+*G/+)*H$

$ABCD+EF+*G/+*H*$

63. Give postfix form expression for: NOT A OR NOT B AND NOT C

Ans 63.  $=((A NOT) OR ((B NOT) AND (C NOT)))$

$$=((A \text{ NOT}) \text{ OR } ((B \text{ NOT } C \text{ NOT } \text{AND})))$$

$$=A \text{ NOT } B \text{ NOT } C \text{ NOT } \text{AND } \text{OR}$$

64. Consider the infix expression  $Q : A+B * C \uparrow (D/E)/F$ . Translate  $Q$  into  $P$ , where  $P$  is the postfix equivalent expression of  $Q$ . what will be the result of  $Q$  if this expression is evaluated for  $A, B, C, D, E, F$  as  $2, 3, 2, 7, 2, 2$  respectively.

Ans 64.  $P = ABCDE/^*F/+$

2,3,2,7,2  
 2,3,2->7/2->3  
 2,3,2,3  
 2,3->2^3->8  
 2,3,8  
 2->3\*8->24  
 2,24,2  
 2->24/2->12  
 2,12  
 2+12  
 Result of evaluation = 14

65. Change the following infix expression into postfix expression.

$$(A+B) *C+D/E-F$$

Ans 65. Equivalent postfix expression:

$$= (A+B) *C+D/E-F$$

$$= (((A+B)*C) + (D/E)) - F$$

$$= (((AB+)*C) + (DE/)) - F$$

$$= AB+ C* DE/ + F-$$

66. Evaluate the following postfix expression. Show the status of stack after execution of each operation separately;

F, T, NOT, AND, F, OR, T, AND

Ans 66. F, T, NOT, AND, F, OR, T, AND

| Scanned Element | Operation                                  | Stack Status |
|-----------------|--------------------------------------------|--------------|
| F               | Push                                       | F            |
| T               | Push                                       | F, T         |
| NOT             | Pop one operand from stack<br>NOT T = F    | F            |
|                 | Push                                       | F, F         |
| AND             | Pop two operands from stack<br>F AND F = F |              |
|                 | Push                                       | F            |
| F               | Push                                       | F, F         |
| OR              | Pop two operands from stack<br>F OR F = F  |              |
|                 | Push                                       | F            |
| T               | Push                                       | F, T         |
| AND             | Pop two operands from stack                |              |

F AND T = F  
 Push  
 Pop all

**Result**      F

67. Evaluate the following postfix expression. Show the status of stack after execution of each operation separately;

T, F, NOT, AND, T, OR, F, AND

Ans 67.            T, F, NOT, AND, T, OR, F, AND

| Scanned Element | Operation                                  | Stack Status |
|-----------------|--------------------------------------------|--------------|
| T               | Push                                       | T            |
| F               | Push                                       | T, F         |
| NOT             | Pop one operand from stack<br>NOT F = T    | T            |
|                 | Push                                       | T, T         |
| AND             | Pop two operands from stack<br>T AND T = T |              |
|                 | Push                                       | T            |
| T               | Push                                       | T, T         |
| OR              | Pop two operands from stack<br>T OR T = T  |              |
|                 | Push                                       | T            |
| F               | Push                                       | T, F         |
| AND             | Pop two operands from stack<br>T AND F = F |              |
|                 | Push                                       | F            |

**Result** F

68. Evaluate the following postfix expression. Show the status of stack after execution of each operation:

5, 2, \*, 50, 5, /, 5, -, +

Ans 68.      5, 2, \*, 50, 5, /, 5, -, +

| Scanned Element | Stack Status |
|-----------------|--------------|
| 5               | 5            |
| 2               | 5.2          |
| *               | 10           |
| 50              | 10, 50       |
| 5               | 10, 50, 5    |
| /               | 10, 10       |
| 5               | 10, 10, 5    |
| -               | 10, 5        |
| +               | 15           |

69. Evaluate the following postfix expression. Show the status if stack after execution of each operation;

60, 6, /, 5, 2, \*, 5, -, +

Ans 69.            60, 6, /, 5, 2, \*, 5, -, +

| Scanned Element | Stack Status |
|-----------------|--------------|
| 60              | 60           |

|   |           |
|---|-----------|
| 6 | 60, 6     |
| / | 10        |
| 5 | 10, 5     |
| 2 | 10, 5, 2  |
| * | 10, 10    |
| 5 | 10, 10, 5 |
| - | 10, 5     |
| + | 15        |

70. Evaluate the following postfix expression using a stack and show the contents of stack after execution of each operation;

5, 3, 2, \*, 4, 2, /, -, \*

Ans 70. 5, 3, 2, \*, 4, 2, /, -, \*

| Scanned Element | Stack Status |
|-----------------|--------------|
| 5               | 5            |
| 3               | 5, 3         |
| 2               | 5, 3, 2      |
| *               | 5, 6         |
| 4               | 5, 6, 4      |
| 2               | 5, 6, 4, 2   |
| /               | 5, 6, 2      |

5, 4

\* 20

71. Evaluate the following postfix notation. Show status of stack after every step of evaluation (i.e. after each operator):

False, NOT, True, AND, True, False, OR, AND

Ans 71. False, NOT, True, AND, True, False, OR, AND

| Scanned Element | Operation                                                                             | Stack Status |
|-----------------|---------------------------------------------------------------------------------------|--------------|
| False           | Push onto stack.                                                                      | False        |
| NOT             | Pop one element from the stack i.e. False. Apply NOT on we get true, push onto stack. |              |
| False           |                                                                                       |              |
| True            | Push onto stack.                                                                      | True, True   |
| AND             | Pop two elements from the stack. Apply AND between them. Push result onto stack.      |              |
| True            | Push True onto stack                                                                  | True, True   |
| False           | Push False onto stack.                                                                | True, True,  |
| False           |                                                                                       |              |
| OR              | Pop two elements from the stack. Apply OR between them and push result onto stack.    | True, True   |
| AND             | Pop two elements from the stack. Apply and between them and push result onto stack.   | True         |

72. Evaluate the following postfix notation, show status of stack of every step of evaluation (i.e. after each Operator):

True, False, NOT, AND, False, True, OR, AND

Ans 72. True, False, NOT, AND, False, True, OR, AND

| Scanned Element | Operation                                                                            | Stack Status |
|-----------------|--------------------------------------------------------------------------------------|--------------|
| True            | Push onto stack.                                                                     | True         |
| NOT             | Pop one element from the stack. Apply NOT on False and push onto stack.              | True, False  |
| AND             | Pop two elements from the stack. Apply AND between them. Push the result onto stack. | True         |
| False           | Push False onto stack.                                                               | True, False  |
| True            | Push True onto stack                                                                 | True, False, |
| True            |                                                                                      |              |
| OR              | Pop two elements from the stack. Apply OR between them and push result onto stack.   | True,        |
| True            |                                                                                      |              |
| AND             | Pop two elements from the stack. Apply and between them and push result onto stack.  | True         |

73. Evaluate the postfix notation of expression:

50, 60, +, 20, 10, -, \*

Ans 73. 50, 60, +, 20, 10, -, \*

| Scanned Element | Stack Status |
|-----------------|--------------|
| 50              | 50           |
| 60              | 50, 60       |
| +               | 110          |
| 20              | 110, 20      |
| 10              | 110, 20, 10  |
| -               | 110, 10      |
| *               | 1100         |
|                 | Pop all      |

74. Evaluate the following postfix notation of expression:

True, False, NOT, AND, True, True, AND, OR

Ans 74. True, False, NOT, AND, True, True, AND, OR

| Scanned Element | Stack Status     |
|-----------------|------------------|
| True            | True             |
| False           | True, False      |
| NOT             | True, True       |
| AND             | True             |
| True            | True, True       |
| True            | True, True, True |
| AND             | True, True       |
| OR              | True             |



75. Evaluate the following postfix notation of expression:

False, True, NOT, OR True, False, AND, OR  
 Ans 75. False, True, NOT, OR True, False, AND, OR

| Scanned Element | Stack Status       |
|-----------------|--------------------|
| False           | False              |
| True            | False, True        |
| NOT             | False, False       |
| OR              | False              |
| True            | False, True        |
| False           | False, True, False |
| AND             | False, False       |
| OR              | False              |

76. Evaluate the following postfix notation of expression. Show the status of stack after each expression:

True, False, NOT, OR, False, True, OR, AND  
 Ans 76. True, False, NOT, OR, False, True, OR, AND

| Scanned Element | Stack Status      |
|-----------------|-------------------|
| True            | True              |
| False           | True, False       |
| NOT             | True, True        |
| OR              | True              |
| False           | True, False       |
| False           | True, False       |
| True            | True, False, True |
| OR              | True, True        |
| AND             | True              |

77. Convert the following infix expression to its equivalent postfix expression. Showing stack contents for the conversion:  
 $(X - Y / (Z + U) * V)$

Ans 77. Let us rewrite like  $(X - Y / (Z + U) * V)$

| Scanned Element | Stack Status | Expression |
|-----------------|--------------|------------|
| (               | (            |            |
| X               | ( X          |            |
| -               | ( - X        |            |
| Y               | ( - XY       |            |
| /               | (            |            |

#### 4 Marks Questions OF STACK AND QUEUE

78. Write the definition of a member function Pop() in C++, to delete a book from a dynamic stack of TEXTBOOKS considering the following code is already included in the program.

```
struct TEXTBOOKS
{
char ISBN[20]; char TITLE[80];
```

```

TEXTBOOKS *Link;
};
class STACK
{
TEXTBOOKS *Top;
public:
STACK() {Top=NULL;}
void Push();
void Pop();
~STACK();
};

```

Ans 78. void STACK::POP()

```

{
if (Top!=NULL)
{
TEXTBOOKS *Temp;
Temp=Top;
cout<<Top->ISBN<<Top->TITLE<<"deleted"<<endl;
Top=Top->Link;
delete Temp;
}
else
cout<<"Stack Empty"<<endl;
}

```

79. Write the definition of a member function PUSH() in C++, to add a new book in a dynamic stack of BOOKS considering the following code is already included in the program:

```

struct BOOKS
{
char ISBN[20], TITLE[80];
BOOKS *Link;
};
class STACK
{
BOOKS *Top;
public:
STACK()
{Top=NULL;}
void PUSH();
void POP();
~STACK();
};

```

Ans 79. void STACK::PUSH()

```

{
BOOKS *Temp;
Temp=new BOOKS;
gets(Temp->ISBN);
gets(Temp->TITLE);
Temp->Link=Top;
}

```

```
Top=Temp;
}
```

80. Write a complete program in c++ to implement a dynamically allocated Stack containing names of Countries.

```
Ans 80. #include<iostream.h>
#include<stdio.h>
struct Node
{ char Country [20] ; Node *Link; };
class Stack
{ Node *Top;
public:
Stack()
{ Top = NULL; }
void Push() ;
void Pop() ;
void Display() ;
~Stack () ;
};
void Stack::Push( )
{
Node *Temp = new Node;
gets(Temp -> Country);
Temp -> Link = Top;
Top = Temp;
}
void Stack::Pop( )
{
if (Top !=NULL)
{
Node *Temp = Top;
Top = Top -> Link;
delete Temp;
}
else
cout<<"stack Empty";
}
void Stack::Display( )
{
Node *Temp = Top;
while (Temp! = NULL)
{
cout<<Temp -> Country <<endl;
Temp = Temp -> Link;
}
}
Stack::~~Stack ( )
{
while (Top!=NULL)
{ NODE *Temp=Top;
Top=Temp->Link;
```

```

delete Temp;
}
}
void main ( )
{ Stack ST;
char Ch;
do
{ cout<<"p/O/D/Q" ;
cin>>Ch;
switch (Ch)
{
case 'P' : ST.Push( ); break;
case 'O' :ST.Pop(); break;
case 'D' :ST.Disp();
}
} while (Ch!='Q');
}

```

81. Write a complete program in C++ to implement a dynamically allocated Queue containing names of Cities.

Ans **81.** #include <iostream.h>

```

#include <conio.h>
struct NODE
{ char City[20];
NODE *Next;
};
class Queue
{ NODE *Rear,*Front;
public:
Queue( )
{ Rear=NULL;Front=NULL;
}
void Qinsert( );
void Qdelete( );
void Qdisplay( );
~Queue( );
} ;
void Queue::Qinsert( )
{
NODE *Temp;
Temp=new NODE;
cout<<"Data:";
gets (Temp->City);
Temp->Next=NULL;
if (Rear==NULL)
{
Rear=Temp;
Front=Temp;
}
else
{

```

```

Rear->Next=Temp;
Rear=Temp;
}
}
void Queue::Qdelete( )
{
if (Front!=NULL)
{
NODE *Temp=Front;
cout<<Front->City<<"Deleted \n";
Front=Front->Next;
delete Temp;
if (Front==NULL)
Rear=NULL;
}
else
cout<<"Queue Empty..";
}
Queue:: Qdisplay( )
{ NODE *Temp=Front;
while (Temp!=NULL)
{
cout<<Temp->City<<endl;
Temp=Temp->Next;
}
}
Queue::~ ~Queue( )//Destructor Function
{ while (Front!=NULL)
{ NODE *Temp=Front;
Front=Front->Next; delete Temp;
}
}
void main( )
{ Queue QU;
char Ch;
do
{
:
:
} while (Ch!='Q');
}

```

82. Write a function QUEINS( ) in C++ to insert an element in a dynamically allocated Queue containing nodes of the following given structure:

```

struct Node
{ int PId ; //Product Id
char Pname [20] ;
NODE *Next ;
} ;

```

ANS 82. void QUEINS (Node \*&Front, Node \*&Rear)  
{ Node \*Temp = new Node;

```

cin>>Temp->PID;
gets (Temp->Pname);
//or cin>>Temp->Pname;
//cin.getline(Temp->Pname);
Temp->Next = NULL;
if(Rear == NULL)
Front = Temp;
else
Rear -> Next = Temp;
Rear = Temp;
}

```

83. Write a function QUEDEL( ) in C++ to display and delete an element from a dynamically allocated Queue containing nodes of the following given structure:

```

struct NODE
{
int Itemno;
char Itemname[20];
NODE *Link;
};

```

Ans 83. class Queue

```

{ Node *Front, *Rear;
public:
QUEUE( )//Constructor to initialize Front and Rear
{
Front = NULL;
Rear = NULL;
}
void QUEINS( ); //Function to insert a node
void QUEDEL( ); //Function to delete a node
void QUEDISP( ); //Function to display nodes
~Queue(); //Destructor to delete all nodes
};
void Queue::QUEDEL( )
{ if (Front!=NULL)
{NODE *Temp=Front;
cout<<Front->Itemno<<" ";
cout<<Front->Itemname<<"Deleted";
Front=Front->Link;
delete Temp;
if (Front NULL)
Rear=NULL;
}
else
cout<<"Queue Empty..";
}

```

84. Write a function in C++ to **delete** a node containing Book's information, from a **dynamically allocated Stack** of Books implemented with the help of the following structure.

```

struct Book
{

```

```

    int BNo ;
    char BName[20] ;
    Book *Next ;
    } ;
Ans 84.    struct Book
    {
    int BNo ;
    char BName[20] ;
    Book *Next ;
    } ;
    class Stack
    {
    Book *Top;
    public:
    Stack( )
    {
    Top = NULL;
    }
    void Push( );
    void Pop( );
    void Display( );
    };
    void Stack::Pop( )
    {
    Book *Temp;
    if( Top= = NULL)
    cout<<"Stack Underflow...";
    else
    {
    cout<<"\nThe Book number of the
    element to delete: "<<Top->BNo;
    cout<<"\nThe Book name of the
    element to delete: "<<Top->BName;
    Temp=Top;
    Top=Top->Next;
    delete Temp;
    }
    }

```

85. Write a function in C++ to perform Insert operation in dynamically allocated Queue containing names of students.

```

    Struct NODE
    { char Name[20];
    NODE *Link;
    };
Ans 85.    class Queue
    {    NODE *front,*rear;
    public:
    Queue( )
    {    front = rear = NULL;    }

```

```

void Insert( );
void Delete( );
void Display( );
};
void Queue::Insert( )
{
NODE *ptr;
ptr=new NODE;
if(ptr= = NULL)
{   cout<<"\nNo memory to create a
new node...";
exit(1);
}
cout<<"\nEnter the name...";
gets(ptr->Name);
ptr->Link=NULL;
if(rear= = NULL)
front=rear=ptr;
else
{
Rear->Link=ptr;
rear=ptr;
}
}

```

86. Write a function in C++ to perform a PUSH operation in a dynamically allocated stack considering the following :

```

struct Node
{
int X,Y ;
Node *Link ;
} ;
class STACK
{
Node *Top ;
public :
STACK( )
{Top = Null ;}
void PUSH( ) ;
void POP( ) ;
~STACK( ) ;
} ;

```

ANs 86. struct Node  
{ int X,Y ;  
Node \*Link ;  
} ;  
class STACK  
{ Node \*Top ;  
public :  
STACK( )  
{ Top = NULL;



```

}
void PUSH( ) ;
void POP( ) ;
~STACK( ) ;
} ;
void STACK::PUSH( )
{ Node *Temp;
Temp=new Node;
if(Temp==NULL)
{ cout<<"\nNo memory to create the node...";
exit(1);
}cout<<"Enter the value of X and Y";
cin>>Temp->X>>Temp->Y;
Temp->Link=Top;
Top=Temp;
}

```

87. Write a function QINSERT () in C++ to perform insert operation on a Linked Queue which contains client no and client name. Consider the following definition of NODE in the code of QINSERT()

```

struct Node
{ long int Cno;      //Client No
char Cname[20];    //Client Name
NODE *Next;
};

```

Ans 87. void QINSERT()

```

{ NODE *P=new NODE();
cout<<"Enter the client number";
cin>>P->Cno;
cout<<"enter the client name";
gets(P->Cname);
P->Next=NULL;
if(front==NULL && rear==NULL)
{ front=P;
rear=P;
}
else
{ rear->Next=P; rear=P; } }

```

88. Write a function PUSHBOOK() in C++ to perform insert operation on a Dynamic Stack, which contains Book\_no and Book\_title. Consider the following definition of NODE, while writing your C++ code.

```

struct NODE
{ int Book_No;
char Book_title[20];
NODE *Next;
};

```

```

};
Ans 88. void PUSHBOOK(NODE *top)
{ NODE *NEW=new NODE;
  cout<<"Enter the book number";
  cin>>NEW->Book_No;
  cout<<"Enter book title";
  gets(NEW->Book_Title);
  NEW->Next=NULL;
  if(top==NULL)
  top=NEW;
  else { NEW->Next=top; top=NEW;}
}

```

89. Write a function POPBOOK() in C++ to perform delete operation on a Dynamic Stack, which contains Book\_no and Book\_Title. Consider the following definition of NODE, while writing your C++ code.

```

struct NODE
{ int Book_No;
  char Book_Title[20];
  NODE *Link;
};

```

```

Ans 89. void POPBOOK(NODE *top)
{
  cout<<"deleting top element from stack\n";
  cout<<"Book No"<<top->Book_No<<endl;
  cout<<"Book title"<<top->Book_Title<<endl;
  NODE *temp=top;
  top=top->Link;
  delete(temp);
}

```

90. Write a function in C++ to perform a DELETE operation in a dynamically allocated queue considering the following description:

```

struct Node
{ float U,V;
  Node *Link;
};
class QUEUE
{ Node *Rear, *Front;
public:
  QUEUE( ) { Rear =NULL; Front= NULL;}
  void INSERT ( );
  void DELETE ( );
  ~QUEUE ( );
};

```

Ans 90.

```

void DELETE()

```

```

{   Node *temp;
    if(front==NULL)                // No element in
the queue
    {   cout<<"UNDERFLOW.....";
        }
    else
    {   temp=front;
        front=front->Link;// Making the second node as the
        first one
            temp->Link = NULL;
            delete temp;    // deleting the previous first
            node.
        }
    }
}

```

91. Define stackpop( ) to delete nodes, for a linked list implemented stack having the following structure for each node:

```

struct Node
{   char name[20];
    int age;
    Node *Link;
};
class STACK
{   Node * Top;
public:
    STACK( ) { TOP=NULL;}
    void stackpush( );
    void stackpop( );
    ~STACK( );
};

```

Ans 91.

```

void stackpop( )                // Pop from the beginning
{   Node *temp;
    if(top==NULL)
    {   cout<<"UNDERFLOW.....";
        }
    else
    {   temp=Top;
        Top=Top->Link;
        temp->Link = NULL;
        delete temp;
    }
}

```

92. Write an algorithm to insert an element from a linked queue depending upon user's choice.

Ans 92.

Algorithm for user choice:

1. ch=0 // Initialize a variable for user choice
2. Read ch //Enter, user choice 1 for push and 2 for pop

3. If(ch == 1) then /\* if top is at end of Array-Queue \*/
4. call insert function
5. Else
6. call delete function
7. End

Algorithm for inserting in Linked-Queue:

- ```
/* Allocate space for ITEM to be inserted */
1. NEWPTR = new node
2. NEWPTR -> INFO = ITEM; NEWPTR -> LINK=NULL
/* Insert in the queue */
3. If rear = NULL Then
{
4. front = NEWPTR
5. rear = NEWPTR
6. else
{
7. rear -> LINK = NEWPTR
8. rear=NEWPTR
}
}
9. END.
```

93. Write an algorithm to delete an element from a linked queue depending upon user's choice.

Ans 93.

Algorithm for user choice:

1. ch=0 // Initialize a variable for user choice
2. Read ch //Enter, user choice 1 for push and 2 for pop
3. If(ch == 1) then /\* if top is at end of Array-Queue \*/
4. call insert function
5. Else
6. call delete function
7. End

Algorithm for deleting in Linked-Queue:

1. If front==NULL Then
2. Print "Queue Empty"
3. Else
  - {
  - 4. ITEM=front->INFO
  - 5. If front=rear Then
    - {
    - 6. front=rear=NULL
    - }
  - 7. Else
  - 8. front = front + 1
  - }
9. END

95. Write an algorithm to insert an element in a circular queue implemented as an array.

Ans 95.

Let Q be a Queue having size N. DATA be the element to be inserted. F and R denote front and rear positions in the queue.

1. If (R=N-1) then R=0  
    else  
    R=R+1
2. If (F=R)  
    { write ('Queue overflow')  
    Goto step 5  
    }
3. Q[R]=DATA
4. If (F=-1) then  
    F=F+1
5. End

96. Write an algorithm to deleting an element from a circular queue implemented as an array.

Ans 96.

Let Q be a Queue having size N. DATA be the temporary variable which stores the deleted element (if possible). F and R denote front and rear positions in the queue.

1. If (F<0) then  
    {  
    write("Queue Underflow")  
    goto step 4  
    }
  2. DATA=Q[F]
  3. If (F=R) then  
    { F=R=-1 }  
    else  
    {  
    if (F=N-1)  
    F=0  
    else  
    F=F+1  
    }
  4. End
-

# SQL

1. Write the SQL statement to create EMPLOYEE relation which contains EMPNO, Name, Skill, PayRate.

Ans CREATE TABLE Employee

```
( EmpNo          CHAR(4) NOT NULL PRIMARY KEY,
  Name           CHAR(20) NOT NULL,
  Skill          CHAR(1),
  PayRate        DECIMAL(8,2));
```

2. Create a table with under mentioned structure (Table name is EMP)

```
EMPNO          NUMBER(4)
  DeptNo        NUMBER(2)
  EmpName       CHAR(10)
  Job           CHAR(10)
  Manager       NUMBER(4)
  Hiredate      DATE
  Salary        NUMBER(7,2)
  Commission    NUMBER(7,2)
```

Ans CREATE TABLE Emp

```
( EmpNo          Number(4) NOT NULL PRIMARY KEY
  DeptNo         Number(2),
  EmpName       Char(10),
  Job           Char(10),
  Manager       Number(4),
  Hiredate      Date,
  Salary        Decimal(7,2);
  Commission    Decimal(7,2) );
```

3. Create a table with the under mentioned structure (Table name is DEPT)

```
DeptNo         NUMBER(2)
  DeptName      CHAR(12)
  Location      CHAR(12)
```

Ans CREATE TABLE Dept

```
( DeptNo        NUMBER(2) NOT NULL PRIMARY KEY,
  DeptName      CHAR(12),
  Location      CHAR(12);
```

4. Create a table called PROJECT with the columns specified below.

```
ProjId         NUMBER(4)
  ProjDesig     CHAR(20)
  ProjStartDT   DATE
  ProjEndDT     DATE
  BudgetAmount  NUMBER(7)
  MaxNoStaff    NUMBER(2)
```

Ans CREATE TABLE Project

```
( ProjId        Number(4) NOT NULL PRIMARY KEY,
  ProjDesig     Char (20) NOT NULL,
  ProjStartDT   Date,
```

ProjEndDT            DATE,  
 BudgetAmount        Decimal(7,2)  
 MaxNoStaff           Number(2) );

5. Create a table called SALGRADE with the columns specified below:

LowSal                NUMBER(7,2)  
 HighSal               NUMBER(7,2)  
 Grade                 NUMBER(2)

Ans CREATE TABLE Salgrade

```
( LowSal            Decimal(7,2),
  HighSal           DECIMAL(7,2),
  Grade             NUMBER(2) );
```

6. Insert a record with suitable data in the table EMP, having system date as the Hiredate.

Ans Date ( ) function gives the system date.

```
INSERT INTO Emp
VALUES (3008, 18, 'XAVIER', 'Manager', Date( ), 3250, NULL);
```

7. Illustrate Cartesian product operation between the two tables/relations using a suitable example.

Ans The two table GABS1 and GABS are as follows:

GAB 1		GAB 2		AGE
ROLL NO	NAME	MARKS	SROLL NO	
1	ABC	90	1	19
2	GABS	92	3	17

The certesian product of above two tables is as follows:

Cartesian Product				
RollNo	Name	Marks	SRollNo	Age
1	ABC	90	1	19
1	ABC	92	3	17
2	GABS	90	1	19
2	GABS	92	3	17

8. What is the purpose of key in a table? Give an example of key in a table.

Ans A key is used to identify a tuple uniquely with in the relation. The value of key is unique. No rows in the relation can have same value.

e.g. In an Employee relation EmpCode is a key using EmpCode one can obtain the information of a particular employee.

9. Explain the concept UNION between two tables, with the help of appropriate example.

Ans The UNION operator is used to combine the result-set of two or more tables, without returning any duplicate rows.

e.g.

**Table CUSTOMERS**

ID	SNAME	CITY
1	A	London
2	B	Berlin
3	C	Mexico

**Table SUPPLIER**

ID	SNAME	CITY
3	D	Mexico
4	E	London
5	F	UK
6	G	Germany

SELECT CITY FROM CUSTOMERS UNION  
SELECT CITY FROM SUPPLIER:  
The resultant table will be:

CITY
London
Berlin
Mexico
UK
Germany

## 6 MARKS QUESTIONS

1. Note: Write SQL commands for (b) to (e) and write the outputs for (f) on the basis of table GRADUATE.

**Table: GRADUATE**

S.NO.	NAME	STIPEND	SUBJECT	AVERAGE	DIV
1	KARAN	400	PHYSICS	68	1
2	DIVAKAR	450	COMPUTER SC	68	1
3	DIVYA	300	CHEMISTRY	62	2
4	ARUN	350	PHYSICS	63	1
5	SABINA	500	MATHEMATICS	70	1
6	JOHN	400	CHEMISTRY	55	2
7	ROBERT	250	PHYSICS	64	1
8	RUBINA	450	MATHEMATICS	68	1
9	VIKAS	500	COMPUTER SC	62	1
10.	MOHAN	300	MATHEMATICS	57	2

- List the names of those students who have obtained **DIV 1** sorted by **NAME**.
- Display a report, listing **NAME**, **STIPEND**, **SUBJEZCT** and amount of stipend received in a year assuming that the **STIPEND** is paid every month.
- To count the number of students who are either **PHYSICS** or **COMPUTER SC** graduates.
- To insert a new row in the **GRADUATE** table:  
**11, "KAJOL", 300, "COMPUTER SC", 75, 1**
- Give the output of following SQL statement based on table **GRADUATE**:



- (I) Select **MIN(AVERAGE)** from **GRADUATE** where **SUBJECT=“PHYSICS”**;
- (II) Select **SUM(STIPEND)** from **GRADUATE** where **DIV=2**;
- (III) Select **AVG(STIPEND)** from **GRADUATE** where **AVERAGE>=65**;
- (IV) Select **COUNT(distinct SUBJECT)** from **GRADUATE**;
- (f) Assume that there is one more table **GUIDE** in the database as shown below:

**Table: GUIDE**

MAINAREA	ADVISOR
PHYSICS	VINOD
COMPUTER SC	ALOK
CHEMISTRY	RAJAN
MATHEMATICS	MAHESH

**What will be the output of the following query:**

```
SELECT      NAME, ADVISOR
FROM        GRADUATE, GUIDE
WHERE       SUBJECT = MAINAREA
```

- Ans 1. (a) Select Name From GRADUATE  
Where DIV = 1  
Order by Name;
- (b) Select Name, stipend, subject, stipend \* 12  
From GRADUATE
- (c) Select count (\*)  
From GRADUATE  
Where subject IN (“PHYSICS”, “COMPUTER SC”);
- (d) Insert into GRADUATE  
Values (11, “KAJOL”, 300, “COMPUTER SC”, 75, 1);
- (e) (i) 63 (ii) 1000 (iii) 450 (iv) 4
- (f) KARAN VINOD  
DIVAKAR ALOK  
DIVYA RAJAN  
ARUN VINOD  
SABINA MAHESH  
JOHN RAJAN  
ROBERT VINOD  
RUBINA MAHESH  
VIKAS ALOK  
MOHAN MAHESH

2. Write SQL commands for (a) to (d) and write the outputs for (f) on the basis of table CLUB.

**Table: CLUB**

COACH ID	COACH NAME	AGE	SPORTS	DATEOFAPP	PAY	SEX
1.	KUKREJA	35	KARATE	27/03/1997	1000	M
2.	RAVINA	34	KARATE	20/01/1998	1200	F
3.	KARAN	34	SQUASH	19/02/1998	2000	M
4.	TARUN	33	BASKETBALL	01/01/1998	1500	M
5.	ZUBIN	36	SWIMMING	12/01/1998	750	M

6.	KETAKI	36	SWIMMING	24/02/1998	800	F
7.	ANKITA	39	SQUASH	20/02/1998	2200	F
8.	ZAREEN	37	KARATE	20/02/1998	1100	F
9.	KUSH	41	SWIMMING	13/01/1998	900	M
10.	SHAILYA	37	BASKETBALL	19/02/1998	1700	M

- (a) To show all information about the swimming coaches in the club.  
 (b) To list names of all coaches with their date of appointment (**DATOFAPP**) in descending order.  
 (c) To display a report, showing coachname, pay, age and bonus (15% of pay) for all the coaches.  
 (d) To insert in a new row in the **CLUB** table with the following data:  
**11, "PRAKASH", 37, "SQUASH", {25/02/98}, 2500, "M"**  
 (e) Give the output of following SQL statements:  
 (i) Select COUNT(distinct SPORTS) from CLUB;  
 (ii) Select MIN(AGE) from CLUB where SEX = "F";  
 (iii) Select AVG(PAY) from CLUB where SPORTS = "KARATE";  
 (iv) Select SUM(PAY) from CLUB where DATOFAPP > {31/01/98};  
 (f) Assume that there is one more table **COACHES** in the database as shown below:

**Table: COACHES**

SPORTS PERSON	SEX	COACH_NO
AJAY	M	1
SEEMA	F	2
VINOD	M	1
TANEJA	F	3

What will be the output of the following query:

```
SELECT SPORTSPERSON, COACHNAME FROM CLUB, COACHES
WHERE COACH_ID = COACH_NO
```

- Ans 2. (a) Select \* From CLUB  
Where sports = "SWIMMING";  
 (b) Select COACHNAME From CLUB  
Order by DATOFAPP desc ;  
 (c) Select coachname, pay, age, 0.15 \* pay From CLUB;  
 (d) Insert into CLUB values (11, "PRAKASH", 37, "SQUASH", {25/02/98}, 2500, "M");  
 (e) (i) 4 (ii) 34 (iii) 1100 (iv) 7800  
 (f) AJAY KUKREJA  
SEEEMA RAVINA  
VINOD KUKREJA  
TANEJA KARAN

3. (a) Write SQL commands for (i) to (vii) on the basis of the table SPORTS

**Table: SPORTS**

Student No.	Class	Name	Game1	Grade	Game2	Grade
10	7	Sammer	Cricket	B	Swimming	A

11	8	Sujit	Tennis	A	Skating	C
12	7	Kamal	Swimming	B	Football	B
13	7	Venna	Tennis	C	Tennis	A
14	9	Archana	Basketball	A	Athletic	C

- (i) Display the names of the students who have grade 'C' in either Game1 or Game2 or both.
  - (ii) Display the number of students getting grade 'A' in Cricket.
  - (iii) Display the names of the students who have same game for both Game1 and Game2.
  - (iv) Display the games taken up by the students, whose name starts with 'A'.
  - (v) Add a new column named 'Marks'.
  - (vi) Assign a value 200 Marks for all those who are getting grade 'B' or grade 'A' in both Game1 and Game2.
  - (vii) Arrange the whole table in the alphabetical order of Name.
- (b) Explain Cartesian product of two relations.

Ans (a) Note: In a given table, two fields are having the same name GRADE, which is a mistake in the paper. So, we are assuming these names to be GRADE1 and GRADE2 respectively where GRADE1 pertains to grade of GAME1 and GRADE2 pertains to grade of GAME2.

- (i) 

```
SELECT Name
FROM Sports
WHERE Grade1 = "C" OR
Grade2 = "C";
```
- (ii) 

```
SELECT Count (*)
FROM Sports
WHERE (Grade1 = "A")
AND Game1 = "Cricket")
OR (Grade2 = "A" and Game2 = "Cricket");
```
- (iii) 

```
SELECT Name
FROM Sports Game1 = Game2;
Where Game1 = Game2
```
- (iv) 

```
SELECT Game1, Game2
FROM Sports
WHERE Name like "A";
```
- (v) 

```
ALTER TABLE Student
ADD Marks float (6, 2);
```
- (vi) 

```
UPDATE Student
SET Marks = 200
Where grade1 <= "B" AND
grad2 <= "B";
```
- (vii) 

```
SELECT *
FROM Sports
ORDER BY Name;
```

(b) The *Cartesian product* is a binary operation and is denoted by a cross(x). The Cartesian product of two relations **A** and **B** is written as **A x B**. The Cartesian product yields a new relation which has (degree number of attributes) equal to the sum of the degrees of the two relations operated upon. The number of tuples (cardinality) of the new relation of the product of the number of tuples of the two relations operated upon. The *Cartesian product* of

two relations yields a relation with all possible combinations of the tuples of the two relations operated upon.

4. Given the following Teacher relation: Write SQL commands for question (a) to (f)

No.	Name	Department	Dateofjoining	Salary	Sex
1.	Raja	Computer	21/05/98	80000	M
2.	Sangita	History	21/05/97	9000	F
3.	Ritu	Sociology	29/08/98	8000	F
4.	Kumar	Linguistics	13/06/96	10000	M
5.	Venkatraman	History	31/10/99	8000	M
6.	Sidhu	Computer	21/05/86	14000	M
7.	Aishwarya	Sociology	11/1/98	12000	F

- To select all the information of teacher in computer department.
- To list the name of the female teacher in History department.
- To list all names of teachers with date of admission in ascending order.
- To display Teacher's name, Department, and Salary of female teachers.
- To count the number of teachers whose salary is less than 10,000.
- To insert a new record in the Teachers table with the following data:  
8, "Mersa", "Computer", {1/1/2000}, 12000, "M".
- Give the output of the following SQL commands:
  - SELECT MIN(DISTINCT Salary) FROM Teacher
  - SELECT MIN(Salary) FROM Teacher WHERE Sex = "M"
  - SELECT SUM(Salary) FROM Teacher WHERE Department = "History"
  - SELECT ACG(Salary) FROM Teacher WHERE dateofjoining < {1/1/98}.

- Ans 4. (a) SELECT \* FROM Teacher  
WHERE Department = "Computer";
- (b) SELECT Name FROM Teacher  
WHERE Department = "History" and Sex = "F";
- (c) SELECT Name FROM Teacher  
ORDERBY Dateofjoining;
- (d) SELECT Name, Department, Salary, FROM Teacher  
WHERE Sex = "F";
- (e) SELECT Count(\*), FROM Teacher  
WHERE Salary < 10,000;
- (f) INSERT into Teacher Values (8, "Mersha", "Computer", {1/1/2000}, 12000, "M");
- (g) (i) 8000 (ii) 8000 (iii) 17000 (iv) 11250

5. Given the following tables for a database INTERIORS :

Note: Write SQL command for (a) to (f) and write the outputs for (g) on the basis of tables INTERIORS and NEWONES.

**Table: INTERIORS**

NO.	ITEMNAME	TYPE	DATEOFSTOCK	PRICE	DISCOUNT
1	Red rose	Double bed	23/02/02	32000	15
2	Soft touch	Baby cot	20/01/02	9000	10
3	Jerry's home	Baby cot	19/02/02	8500	10

4	Rough wood	Office Table	01/01/02	20000	20
5	Comfort zone	Double bed	12/01/02	15000	20
6	Jerry look	Baby cot	24/02/02	7000	19
7	Lion king	Office Table	20/02/02	16000	20
8	Royal tiger	Sofa	22/02/02	30000	25
9	Park sitting	Sofa	13/12/01	9000	15
10	Dine Paradise	Dining Table	19/02/02	11000	15

**Table: NEWONES**

NO.	ITEMNAME	TYPE	DATEOFSTOCKS	PRICE	DISCOUNT
11	White wood	Double bed	23/03/03	20000	20
12	James 007	Sofa	20/02/03	15000	15
13	Tom look	Baby cot	21/02/13	7000	10

- To show all information about the sofas from the **INTERIORS** table.
- To list the **ITEMNAME** which are priced at more than 10,000 from the **INTERIORS** table.
- To list **ITEMNAME** and **TYPE** of those items, in which **DATEOFSTOCK** is before 22/01/02 from the **INTERIERS** table in the descending order of **ITEMNAME**.
- To display **ITEMNAME** and **DATEOFSTOCK** of those items, in which the discount percentage is more than 15 from **INTERIORS** table.
- To count the number of items, whose type is “**Double Bed**” from **INTERIOR** table.
- To insert a new row in the **NEWONES** table with the following data:  
**14, “True Indian”, “Office Table”, {28/03/03}, 15000,20**
- Give the output of following SQL statement:

**Note:** outputs of the below mentioned queries should be based in original data given in both the tables i.e., without considering the insertion done in (f) part of this question.

- Select COUNT(distinct TYPE) from INTERIORS;
- Select AVG(DISCOUNT) from INTERIORS, where TYPE = “Baby cot”;
- Select SUM(Price) from INTERIORS where DATEOFSTOCK < {12/02/02}.

- Ans 5. (a) Select \* From INTERIORS Where TYPE = “Sofa”;
- (b) Select ITEMNAME From INTERIORS Where PRICE > 10000;
- (c) Select ITEMNAME, TYPE From INTERIORS  
Where DATEOFSTOCK < {22/01/02} Order by ITEMNAME;
- (d) Select ITEMNAME, DATEOFSTOCK From INTERIORS Where  
DISCOUNT > 15;
- (e) Select Count (\*) From INTERIORS Where TYPE = “Double Bed”;
- (f) Insert into NEWONES Values  
(14, “True Indian”, “Office Table”, {28/03/03}, 15000, 20);
- (g) (i) 5 (ii) 13 (iii) 43000

6. Given the following tables for a database FURNITURE :

NOTE: Write SQL command for (a) to (f) and write the outputs for (g) on the bases of tables FURNITURE AND ARRIVALS.

**Table: FURNITURE**

NO.	ITEMNAME	TYPE	DATEOFSTOCK	PRICE	DISCOUNT
1	White lotus	Double Bed	23/02/02	30000	25
2	Pink feather	Baby cot	20//01/02	7000	20
3	Dolphin	Baby cot	19/02/02	9500	20
4	Decent	Office Table	01/01/02	25000	30
5	Comfort zone	Double Bed	12/01/02	25000	25
6	Donald	Baby cot	24/02/02	6500	15
7	Royal Finish	Office Table	20/02/02	18000	30
8	Royal tiger	Sofa	22/02/02	31000	30
9	Econo sitting	Sofa	13/12/01	9500	25
10	Eating paradise	Dining Table	19/02/02	11500	25

**Table: ARRIVALS**

NO.	ITEMNAME	TYPE	DATEOFSTOCK	PRICE	DISCOUNT
11	Wood Comfort	Double Bed	23/03/03	25000	25
12	Old Fox	Sofa	20/02/03	17000	20
13	Micky	Baby cot	21/02/02	7500	15

- (a) To show all information about the baby cots from the FURNITURE table.
- (b) To list the ITEMNAME which are priced at more than 15000 from the FURNITURE table.
- (c) To list ITEMNAME AND TYPE of those items, in which DATEOFSTOCK is before 22/01/02 from the FURNITURE table in descending order of ITEMNAME.
- (d) To display ITEMNAME and DATEOFSTOCK of those items, in which the DISCOUNT percentage is more than 25 from FURNITURE table.
- (e) To count the number of items, whose TYPE is "Sofa" from FURNITURE table.
- (f) To insert a new row in the ARRIVALS table with the following data:  
14, "Velvet touch", Double bed", {25/03/03}, 25000, 30
- (g) Give the output of following SQL statement:

**Note:** outputs of the below mentioned queries should be based on original data given in both the tables i.e., without considering the insertion done in (g) part of this question.

- (i) Select COUNT(distinct TYPE) from FURNITURE;
- (ii) Select MAX(DISCOUNT) from FURNITURE,ARRIVALS;
- (iii) Select AVG(DISCOUNT) from FURNITURE where TYPE = "Baby cot";
- (iv) Select SUM(PRICE) from FURNITURE where DATEOFSTOCK < {12/02/02}.

- Ans 6. (a) Select \* From FURNITURE Where TYPE = "Baby cot";  
 (b) Select ITEMNAME From FURNITURE Where PRICE > 15000;

- (c) Select ITEMNAME, TYPE From FURNITURE  
Where DATEOFSTOCK < {22/01/02} Order by ITEMNAME;
- (d) Select ITEMNAME, DATEOFSTOCK From FURNITURE Where  
DISCOUNT > 25.
- (e) Select Count (\*) From FURNITURE Where TYPE = "Sofa";
- (f) Insert Into ARRIVALS Values (14, "Velvet touch", "Double bed", {25/03/03},  
25000, 30);
- (g) (i) 5 (ii) 30 (iii) 18.33 (iv) 66500.

7. Given the following tables for a database  
LIBRARY:

**Table: Books**

Book_Id	Book_Name	Author_Name	Publishers	Price	Type	Qty.
F0001	The Tears	William Hopkins	First Publ.	750	Fiction	10
F0002	Thunderbolts	Anna Roberts	First Publ.	700	Fiction	5
T0001	My First C++	Brian & Brooke	EPB	250	Text	10
T0002	C++ Brainworks	A.W.Rossaine	TDH	325	Text	5
C0001	Fast Cook	Lata Kapoor	EPB	350	Cookery	8

**Table: Issued**

Book_Id	Quantity Issued
F0001	3
T0001	1
C0001	5

Write SQL queries for (a) to (f):

- (a) To show Book name, Author name and Price of books of EPB publishers.
- (b) To list the names of the books of Fiction Type.
- (c) To display the names and price of the books in descending order of their price.
- (d) To increase the price of all books of first publisher by 50.
- (e) To display the Book\_Id, Book\_Name and Quantity issued for all books which have been issued. (The query will require contents from both the tables).
- (f) To insert a new row in the table Issued following the data: "F0002",4
- (g) Give the output of the following queries based on the above tables:
  - (i) SELECT COUNT(DISTINCT Publishers) FROM Books.
  - (ii) SELECT SUM(Price) FROM Books WHERE Quantity > 5.
  - (iii) SELECT BOOK\_NAME, AUTHOR\_NAME FROM Books WHERE Price < 500.
  - (iv) SELECT COUNT (\*) FROM Books.

- Ans 7. (a) SELECT Book\_Name, Author\_Name, Price  
FROM Books  
WHERE Publishers = "EPB";
- (b) SELECT Book\_Name  
FROM Books  
WHERE Type = "Fiction";
- (c) SELECT Book\_Name, Price  
FROM Books

- ORDER BY Price DESC;
- (d) UPDATE Book  
SET Price = Price + 50  
WHERE Publishers = "First Publ.";
- (e) SELECT Books.Book\_Id, Book\_Name, Quantity\_Issued  
FROM Books, Issued  
WHERE books.Book\_Id = Issued.Book\_Idf;
- (f) INSERT INTO Issued  
VALUES("F0002",4);
- (g) (i) 3      (ii) 1350
- (iii) MY First C++      Brain & Brooke  
C++ Brainworks      A.W. Rosssaine  
Fast Cook      Lata Kapoor
- (iv) 5

8. Write SQL commands for (a) to (f) and write output for (g) on the basis of Teacher relation given below:

**relation Teacher**

No.	Name	Age	Department	Date of join	Salary	Sex
1.	Jugal	34	Computer	10/01/97	12000	M
2.	Sharmila	31	History	24/03/98	20000	F
3.	Sandeep	32	Maths	12/12/96	30000	M
4.	Sangeeta	35	History	01/07/99	40000	F
5.	Rakesh	42	Maths	05/09/97	25000	M
6.	Shyam	50	History	27/06/98	30000	M
7.	Shiv Om	44	Computer	25/02/97	21000	M
8.	Shalakha	33	Maths	31/07/97	20000	F

- (a) To show all information about the teacher of history department
- (b) To list the names of female teacher who are in Hindi department
- (c) To list names of all teachers with their date of joining in ascending order.
- (d) To display student's Name, Fee, Age for male teacher only
- (e) To count the number of teachers with Age>23.
- (f) To inset a new row in the TEACHER table with the following data:  
9, "Raja", 26, "Computer", {13/05/95}, 2300, "M"
- (g) Give the output of following SQL statements:
- (i) Select COUNT (distinct department) from TEACHER;
- (II) Select MAX (Age) from TEACHER where Sex = "F"
- (iii) Select AVG (Salary) from TEACHER where Date of join < {12/07/96};
- (v) Select SUM (Salary) from TEACHER where Date of join < {12/07/96};

- Ans 8. (a) SELECT \* FROM Teacher  
WHERE Department = "History";
- (b) SELECT Name FROM Teacher  
WHERE Department = "Hindi" and Sex = "F";
- (c) SELECT Name, Dateofjoin  
FROM Teacher  
ORDER BY Dateofjoin;



(d) (The given query is wrong as no. information about students and fee etc. is available.

The query should actually be

*To display teacher's Name, Salary, Age for male teacher only)*

```
SELECT Name, Salary, Age FROM Teacher
```

```
WHERE Age > 23 AND Sex = 'M';
```

(e) SELECT COUNT (\*) FROM Teacher

```
WHERE Age > 23;
```

(f) INSERT INTO Teacher

```
VALUES (9, "Raja", 26, "Computer", {13/05/95}, 2300, "M");
```

(g) (i) 3 (ii) 35 (iii) 23600 (AVG (Salary))

(iv) 2300 – after insertion (It is SUM (Salary))

9. Write SQL commands for (a) to (f) and Write the outputs for (g) on the basis of table HOSPITAL

**Table: HOSPITAL**

No.	Name	Age	Department	Dateofadm	Charges	Sex
1	Arpit	62	Surgery	21/01/98	300	M
2	Zarina	22	ENT	12/12/97	250	F
3	Kareem	32	Orthopedic	19/02/98	200	M
4	Arun	12	Surgery	11/01/98	300	M
5	Zubin	30	ENT	24/02/98	250	M
6	Ketaki	16	ENT	12/01/98	250	M
7	Ankita	29	Cardiology	20/02/98	800	F
8	Zareen	45	Gynecology	22/02/98	300	F
9	Kush	19	Cardiology	13/01/98	800	M
10	Shilpa	23	Nuclear Medicine	21/02/98	400	F

(a) To select all the information of patients of cardiology department.

(b) To list the names of female patients who are in ENT department.

(c) To list name of all patients with their date of admission in ascending order.

(d) To display Patient's Name, Charges, Age for only female patients.

(e) To count the number of patients with Age<30.

(f) To inset in a new row in the HOSPITAL table with the following data:

11, "Aftab", 24, "Surgery", {25/02/98}, 300, "M"

(g) Give the output of following SQL statements:

(i) Select COUNT (DISTINCT charges) from HOSPITAL;

(ii) Select MIN (Age) from HOSPITAL where Sex = "F"

(iii) Select SUM (Charges) from HOSPITAL where Department = "ENT"

(iv) Select AVG (Charges) from HOSPITAL where Datofadm < {12/08/98}

Ans 9. (a) SELECT \* FROM Hospital

```
WHERE Department = "Cardiology;
```

(b) SELECT Name FROM Hospital

```
WHERE Department = "ENT" AND Sex = "F";
```

(c) SELECT Name, Datofadm FROM Hospital

```
ORDER BY Datofadm;
```

(d) SELECT Name, Charges, Age FROM Hospital

```
WHERE Sex = "F";
```

(e) SELECT COUNT (\*) FROM Hospital

- WHERE Age < 30;
- (f) INSERT INTO Hospital  
VALUES (11, "Aftab", 24, "Surgery", {25/02/98}, 300, "M");
- (g) (i) 5 (ii) 16 (iii) 750 (iv) 340.

10. Answer the questions (a) and (b) on the basis of the following tables **STORE** and **ITEM**.

**TABLE STORE**

SNo	SName	Area
S01	ABC Computronics	GK II
S02	All Infotech Media	CP
S03	Tech Shoppe	Nehru Place
S04	Geeks Techno Soft	Nehru Place
S05	Hitech Tech Store	CP

**TABLE ITEM**

INo	IName	Price	SNo
T01	Mother Board	12000	S01
T02	Hard Disk	5000	S01
T03	Keyboard	500	S02
T04	Mouse	300	S01
T05	Mother Board	13000	S02
T06	Keyboard	400	S03
T07	LCD	6000	S04
T08	LCD	5500	S05
T09	Mouse	350	S05
T10	Hard Disk	4500	S03

- (a) Write the SQL queries (i) to (iv):
- (i) To display IName and Price of all the items in ascending order of their Price.
- (ii) To display SNo and SName of all store location in CP.
- (iii) To display Minimum and maximum Price of each IName from the table ITEM.
- (iv) To display IName, Price of all items and their respective SName where they are available.
- (b) Write the output of the following SQL commands (i) to (iv):
- (i) SELECT DISTINCT IName FROM ITEM  
WHERE Price >=5000;
- (ii) SELECT Area, COUNT (\*)  
FROM STORE GROUP BY Area;
- (iii) SELECT COUNT (DISTINCT Area)  
FROM STORE;
- (iv) SELECT IName, Price \* 0.05  
DISCOUNT FROM ITEM  
WHERE SNo IN ('S02', 'S03');

- Ans 10. (a) (i) SELECT IName, Price  
FROM ITEM  
ORDER BY Price ASC;
- (ii) SELECT IName  
FROM STORE

- WHERE Area = 'CP';
- (iii) SELECT IName,  
MIN (Price) "Minimum Price",  
MAX (Price) "Maximum Price"  
FROM ITEM  
GROUP BY IName;
- (iv) SELECT IName, Price, SName  
FROM ITEM I, STORE S  
WHERE I, SNo = S.No
- (b) (i) 

<u>IName</u>
Mother Board
Hard Disk
LCD
- (ii) 

<u>AREA</u>	<u>COUNT(*)</u>
GK II	1
CP	2
Nehru place	2
- (iii) 

<u>Count (DISTINCT Area)</u>
3
- (iv) 

<u>IName</u>	<u>DISCOUNT</u>
Keyboard	25
Mother Board	650
Keyboard	20
Hard Disk	225

11. Answer the questions (a) and (b) on the basis of the following tables SHOPPE and ACCESSORIES.

**TABLE SHOP**

<u>ID</u>	<u>SName</u>	<u>Area</u>
S0001	ABC Computeronics	CP
S0002	All Infotech Media	GK II
S0003	Tech Shoppe	CP
S0004	Greeks Techno Soft	Nehru Place
S0005	Hitech Tech Store	Nehru Place

**TABLE ACCESSORIES**

<u>No</u>	<u>Name</u>	<u>Price</u>	<u>ID</u>
A01	Mother Board	12000	S01
A02	Hard Disk	5000	S01
A03	Keyboard	500	S02
A04	Mouse	300	S01
A05	Mother Board	13000	S02
A06	Keyboard	400	S03
A07	LCD	6000	S04
T08	LCD	5500	S05

T09	Mouse	350	S05
T10	Hard Disk	4500	S03

- (a) Write the SQL queries:
- (i) To display Name and Price of all the accessories in ascending order of their Price.
- (ii) To display Id and SName of all Shoppe in Nehru Place.
- (iii) To display Minimum and Maximum Price of each Name of accessories.
- (iv) To display Name, Price of all accessories and their respective SName where they are available.
- (b) (i) `SELECT DISTINCT Name FROM ACCESSORIES WHERE Price >= 500;`
- (ii) `SELECT Area, COUNT (*) FROM GROUP BY Area;`
- (iii) `SELECT COUNT (DISTINCT Area) FROM SHOPPE;`
- (iv) `SELECT Name, Price*0.05 DISCOUNT FROM ACCESSORIES WHERE SNo IN ('S02, 'S03');`

- Ans 11. (a) (i) `SELECT Name, Price FROM ACCESSORIES ORDER BY Price ASC;`
- (ii) `SELECT ID, Price FROM SHOPPE WHERE Area = 'Nehru Place';`
- (iii) `SELECT MIN (Price) "Minimum Price", MAX (Price) "Maximum Price", Name FROM ACCESSORIES GROUP BY Name;`
- (iv) `SELECT Name, Price, SName FROM ACCESSORIES A. SHOPPE S WHERE A. ID = S. ID`

- (b) (i)
- | NAME         |
|--------------|
| Mother Board |
| Hard Disk    |
| LCD          |

- (ii)
- | AREA        | COUNT(*) |
|-------------|----------|
| CP          | 2        |
| GK II       | 1        |
| Nehru Place | 2        |

- (iii) `COUNT (DISTINCT Area)`
- |   |
|---|
| 3 |
|---|

- (iv) The given query will result in an error as there is no column named SNo in Accessories table.

12. Write SQL queries for (a) to (f) and write the outputs for the SQL queries mentioned shown in (g<sub>1</sub>) to (g<sub>4</sub>) parts on the basis of tables PRODUCTS AND SUPPLIERS

**TABLE PRODUCTS**

PID	SNAME	QTY	PRICE	COMPANY
	<b>SUPCODE</b>			
101	DIGITAL CAMERA14X	120	12000	RENIX
	S01			
102	DIGITAL PAD Ili	100	22000	DIGI POP S02
104	PEN DRIVE 16 GB	500	1100	STOREKING S01
106	LED SCREEN	70	28000	DISEXPERTS S02
105	CAR GPS SYSSTEM60	12000		MOVEON S03

<b>TABLE SUPPLIERS</b>		
SUPCODE	SNAME	CITY
S01	GET ALL INC	KOLKATA
S03	EASY MARKET CORP	DELHI
S02	DIGI BUSY GROUP	CHENNAI

- (a) To display the details of all the products in ascending order of product names (i.e. PNAME).
- (b) To display product name and price of all those products, whose price is in the range of 10000 and 15000 (both values inclusive).
- (c) To display the number of products which are supplied by each supplier i.e. the expected output should be
- |     |   |
|-----|---|
| S01 | 2 |
| S02 | 2 |
| S03 | 1 |
- (d) To display the price, product name (i.e. PName) and quantity (i.e. QTY) of those which have quantity more than 100.
- (e) To display the names of those suppliers, who are either from DELHI or from CHENNAI.
- (f) To display the name of the companies and the name of the products in descending order of company names.
- (g) Obtain the outputs of the following SQL queries based on the data given in tables PRODUCTS and SUPPLIERS.
- (g<sub>1</sub>) SELECT DISTINCT SUPCODE FROM PRODUCTS;
- (g<sub>2</sub>) SELECT MAX (PRICE), MIN (PRICE) FROM PRODUCTS;
- (g<sub>3</sub>) SELECT PRICE \* QTY AMOUNT FROM PRODUCTS WHERE PID = 104;
- (g<sub>4</sub>) SELECT PNAME, SNAME FROM PRODUCTS P, SUPPLIERS S  
WHERE P. SUPCODE = S. SUPCODE AND QTY>100;

Ans 12.

- (a) SELECT \*  
FROM PRODUCTS  
ORDER BY NAME;
- (b) SELECT PNAME, PRICE  
FROM PRODUCTS  
WHERE PRICE BETWEEN 10000 AND 15000;
- (c) SELECT SUPCODE, COUNT (\*)  
FROM PRODUCTS  
GROUP BY SUPCODE;
- (d) SELECT PRICE, PNAME, QTY  
FROM PRODUCTS  
WHERE QTY > 100;
- (e) SELECT SNAME

- FROM SUPPLIERS  
WHERE CITY IN ('DELHI', CHENNAI');
- (f) SELECT COMPANY, PNAME  
FROM PRODUCTS  
ORDER BY COMPANY DESC;
- (g) (g<sub>1</sub>) 

<b>SUPCODE</b>
S01
S02
S03
- (g<sub>2</sub>) 

<b>MAX (PRICE)</b>	<b>MIN (PRICE)</b>
28000	1100
- (g<sub>3</sub>) 

<b>AMOUNT</b>
550000
- (g<sub>4</sub>) 

<b>PNAME</b>	<b>SNAME</b>
DIGITAL CAMERA 14X	GET ALL INC
PEN DRIVE 16 GB	GET ALL INC

13. Write SQL queries for (a) to (f) and write the outputs for the SQL queries mentioned shown in (g<sub>1</sub>) to (g<sub>4</sub>) parts on the basis of tables ITEMS and TRADERS.

<b>TABLE ITEMS</b>				
<b>CODE TCODE</b>	<b>INAME</b>	<b>QTY</b>	<b>PRICE</b>	<b>COMPANY</b>
1001	DIGITAL PAD12i	120	11000	XENITA
T01				
1006	LED SCREEN 40	70	38000	SANTORA
T02				
1004	CAR GPS SYSTEM	50	21500	GEOKNOW
T01				
1003	DIGITAL CAMERA	160	8000	DIGICLICK
T02				
1005	PEN DRIVE 32 GB	600	1200	STOREHOME
T03				

<b>TABLE TRADERS</b>		
<b>TCODE</b>	<b>TNAME</b>	<b>CITY</b>
T01	ELECTRONIC SALES	MUMBAI
T03	BUSY STORE CORP	DELHI
T02	DISP HOUSE INC	CHENNAI

- (a) To display the details of all the items in ascending order of item names (i.e. INAME).
- (b) To display item name and price of all those items, whose price is in the range of 10000 and 22000 (both values inclusive).
- (c) To display the number of items, which are traded by each trader. The expected output of this query should be

T01    2

T02 2  
T03 1

- (d) To display the price, item name (i.e. INAME) and quantity (i.e. QTY) of those items which have quantity more than 150.
- (e) To display the names of those traders, who are either from DELHI or from MUMBAI.
- (f) To display the name of the companies and the name of the items in descending order of company names.
- (g) Obtain the outputs of the following SQL queries based on the data given in tables ITEMS and TRADERS.
- (g<sub>1</sub>) SELECT MAX (PRICE), MIN (PRICE) FROM ITEMS;
- (g<sub>2</sub>) SELECT PRICE \* QTY AMOUNT FROM ITEMS WHERE CODE = 1004;
- (g<sub>3</sub>) SELECT DISTINCT TCODE FROM ITEMS;
- (g<sub>4</sub>) SELECT INAME, TNAME FROM ITEMS I, TRADERS T  
WHERE I, TCODE AND QTY<100;

Ans 13.

- (a) SELECT \*  
FROM ITEMS ORDER BY INAME;
- (b) SELECT INAME, PRICE  
FROM ITEMS  
WHERE PRICE BETWEEN 10000  
AND 22000;
- (c) SELECT TCODE, COUNT (\*)  
FROM ITEMS  
GROUP BY TCODE;
- (d) SELECT PRICE, INAME, QTY  
FROM ITEMS  
WHERE QTY >150;
- (e) SELECT TNAME  
FROM TRADERS  
WHERE CITY = 'MUMBAI' OR CITY ='DELHI';
- (f) SELECT COMPANY, INAME  
FROM ITEMS  
ORDER BY COMPANY DESC;
- (g) (g<sub>1</sub>)
- | MAX (PRICE) | MIN (PRICE) |
|-------------|-------------|
| 38000       | 1200        |
- (g<sub>2</sub>)
- | AMOUNT  |
|---------|
| 1075000 |
- (g<sub>3</sub>)
- | TCODE |
|-------|
| T01   |
| T02   |
| T03   |
- (g<sub>4</sub>)
- | INAME          | TNAME            |
|----------------|------------------|
| LED SCREEN 40  | DISP HOUSE INC   |
| CAR GPS SYSTEM | ELECTRONIC SALES |

14. Write SQL queries for (a) to (f) and write the outputs for the SQL queries mentioned shown in (g<sub>1</sub>) to (g<sub>4</sub>) parts on the basis of tables APPLICANTS and COURSES.

<b>TABLE APPLICANTS</b>				
<b>NO</b>	<b>NAME</b>	<b>FEE</b>	<b>GENDER</b>	<b>C_ID</b>
<b>JOINYEAR</b>				
1012	Amandeep	30000	M	A01
	2012			
1102	Avisha	25000	F	A02
	2009			
1103	Ekant	30000	M	A02
	2011			
1049	Arun	30000	M	A03
	2009			
1025	Amber	40000	M	A02
	2011			
1106	Ela	40000	F	A05
	2010			
1017	Nikita	35000	F	A03
	2012			
1108	Arleena	30000	F	A03
	2012			
2109	Shakti	35000	M	A04
	2011			
1101	Kirat	25000	M	A01
	2012			

<b>TABLE COURSES</b>	
<b>C_ID</b>	<b>COURSE</b>
A01	FASHION DESIGN
A02	NETWORKING
A03	HOTEL MANAGEMENT
A04	EVENT MANAGEMENT
A05	OFFICE MANAGEMENT

- (a) To display name, fee, gender, joinyear about the applicants, who have joined before 2010.
- (b) To display the names of applicants, who are paying fee more than 30000.
- (c) To display name of all applicants in ascending order of their joinyear.
- (d) To display the year and the total number of applicants joined in each YEAR from the table APPLICANTS.
- (e) To display the C\_ID (i.e. Course ID) and the number of applicants registered in the course from the APPLICANTS table.
- (f) To display the applicant's name with their respective course's name from the tables APPLICANTS and COURSES.
- (g) Give the output of following SQL statements:
- (g<sub>1</sub>) SELECT NAME, JOIN YEAR FROM APPLICANTS WHERE GENDER= 'F' AND C\_ID= '02';
- (g<sub>2</sub>) SELECT MIN (JOINYEAR) FROM APPLICANTS WHERE Gender= 'M';



(g3) SELE CT AVG (FEE) FROM APPLICANTS WHERE C\_ID= 'A01' OR C\_ID= 'A05';

(g4) SELECT SUM (FEE), C\_ID FROM APPLICATIONS GROUP BY C\_ID HAVING COUNT (\*) =2;

Ans

14.

- (a) SELECT NAME, FEE, GENDER, JOINYEAR  
FROM APPLICANTS  
WHERE JOINYEAR<2010;
- (b) SELECT NAME  
FROM APPLICANTS  
WHERE FEE >30000;
- (c) SELECT NAME  
FROM APPLICANTS  
ORDER BY JOINYEAR;
- (d) SELECT JOINYEAR, COUNT (\*)  
FROM APPLICANTS  
GROUP BY JOINYEAR
- (e) SELECT C\_ID, COUNT (\*)  
FROM APPLICANTS  
ORDER BY C\_ID;
- (f) SELECT NAME, COURSE  
FROM APPLICANTS, COURSES  
WHERE APPLICANTS. C\_ID=COURSES.C\_ID;

(g1)

NAME	JOINYEAR
Avisha	2009

(g2)

MIN (JOINYEAR)
2009

(g3)

AVG(FEE)
31666.666

(g4)

SUM(FEE)	C_ID
55000	A01

15. Consider the following tables CABHUB and CUSTOMER and answer (a) and (b) parts of this question:

**TABLE CABHUB**

Vcode	VehicleName	Make	Color	Capacity	Charges
100	Innova	Toyota	WHITE	7	15
102	SX4	Suzuki	BLUE	4	14
104	C-Class	Mercedes	RED	4	35
105	A-Star	Suzuki	WHITE	3	14
108	Indigo	Tata	SILVER	3	12

**TABLE CUSTOMER**

Code	CName	VCode
1	Hemant Sahu	101
2	Raj Lal	108
3	Feroza Shah	105
4	Ketan Dhal	104

- (a) Write SQL commands for the following statements:
- (i) To display the names of all the white colored vehicles.
- (ii) To display name of vehicle, make the capacity of vehicles in ascending order of their sitting Capacity.
- (iii) To display the highest charges at which a vehicle can be hired from CABHUB.
- (iv) To display the customer and the corresponding name of the vehicle hired by them.
- (b) (i) SELECT COUNT (DISTINCT Make) FROM CABHUB;  
(ii) SELECT MAX (CHARGES), MIN (Charges) FROM CABHUB;  
(iii) SELECT COUNT (\*), Make FROM CABHUB;  
(iv) SELECT VehicleName FROM CABHUB WHERE Capacity = 4;

- Ans 15. (a) (i) SELECT VehicleName  
FROM CABHUB WHERE Color = 'WHITE';
- (ii) SELECT VehicleName, Make,  
Capacity FROM CABHUB  
ORDER BY Capacity;
- (iii) SELECT MAX (Charges)  
FROM CABHUB;
- (iv) SELECT CName, VehicleName  
FROM CABHUB, CUSTOMER  
WHERE CABHUB, Vcode = CUSTOMER, Vcode;

(b) (i)

COUNT (DISTINCT Make)
4

(ii)

MAX (Charges)	MIN (Charges)
35	12

(iii) This query will execute but count (\*) will result one row and Make will give more than one row so both are not compatible together. But on removing Make from select clause it will give following result.

COUNT (*)
5

(iv)

VehicleName
SX4 C-Class

16. Consider the following tables CARDEN and CUSTOMER and answer (a) and (b) parts of this question:

TABLE CARDEN					
Ccode	CarName	Make	Color	Capacity	Charges

501	A-star	Suzuki	RED	3	14
503	Indigo	Tata	SILVER	3	12
502	Innova	Toyota	WHITE	7	15
509	SX4	Suzuki	SILVER	4	14
510	C-Class	Mercedes	RED	4	35

**TABLE CUSTOMER**

CCode	Cname	Ccode
1001	Hamant Sahu	501
1002	Raj Lal	509
1003	Feroja Shah	503
1004	Ketan Dhal	502

(a) Write SQL commands for the following statements:

(i) To display the name of all the SILVER colored cars.

(ii) To display name of car, make and capacity of cars in descending order of their sitting capacity.

(iii) To display the highest Charges at which a vehicle can be hired from CARDEN.

(iv) To display the customer name and the corresponding name of the cards hired by them.

(b) Give the output of the following SQL queries:

(i) SELECT COUNT (DISTINCT Make) FROM CARDEN;

(ii) SELECT MAX (Charges), MIN (Charges) FROM CARDEN;

(iii) SELECT COUNT (\*), Make FROM CARDEN;

(iv) SELECT CarName FROM CARDEN WHERE Capacity = 4;

Ans 16. (a) (i) SELECT CarName

FROM CARDEN

WHERE Color = 'SILVER';

(ii) SELECT CarName, Make, Capacity

FROM CARDEN;

ORDER BY Capacity DESC;

(iii) SELECT MAX (Charges)

FROM CARDEN;

(iv) SELECT CName, CarName

FROM CARDEN, CUSTOMER

WHERE CARDEN.Ccode = CUSTOMER.Ccode;

(b) (i)           COUNT (DISTINCT Make)

          4

(ii)           MAX (Charges)          MIN (Charges)

          35

          12

(iii) This query will execute but count (\*) will result one row and Make will give more than one

row so both are not compatible together. But on removing Make from select clause it will

give compatible result:

          COUNT (\*)

(iv)

CarName
SX4
C-Class

17. Consider the following tables EMPLOYEE and SALGRADE and answer (a) and (b) parts of this question:

ECODE	NAME	DESIG	SGRADE	DOJ	DOB
101	Abdul Ahmad	EXECUTIVE	S03	23-MARCH-2003	13-JAN-1980
102	Ravi Chander	HEAD-IT	S02	12-FEB-2010	22-JUL-1987
103	John Ken	Receptionist	S03	24-JUN-2009	24-FEB-1983
105	Nazar Ameen	GM	S02	11-AUG-2006	03-MAR-1984
108	Priyam Sen	CEO	S01	29-DEC-2004	19-JAN-1982

SGRADE	SALARY	HRA
S01	56000	18000
S02	32000	12000
S03	24000	8000

- (a) Write SQL commands for the following statements:
- To display the detail of all the EMPLOYEE in descending order of DOJ.
  - To display name and design of those EMPLOYEE, whose sgrade is either S02 or S03.
  - To display the content of all the EMPLOYEE table, whose DOJ is in between '09-FEB-2006' and '08-AUG-2009'.
  - TO add a new row in the EMPLOYEE table with the following data: 109, 'Harish Roy', 'HEAD-IT', 'S02', '09-SEP-2007', '21-APR-1983'.
- (b) Give the output of the following SQL queries:
- SELECT COUNT (SGRADE), SGRADE FROM EMPLOYEE GROUP BY SGRADE;
  - SELECT MIN (DOB), MAX (DOJ) FROM EMPLOYEE;
  - SELECT NAME, SALARY FROM EMPLOYEE E, SALGRADE S WHERE E. SGRADE = S. SGRADE AND E. ECODE<103;
  - SELECT SGRADE, SALARY+HRA FROM SALGRADE WHERE SGRADE = 'S02';

Ans 17. (a) (i) SELECT \*  
FROM EMPLOYEE ORDER BY DOJ DESC;  
(ii) SELECT NAME, DESIG  
FROM EMPLOYEE

WHERE SGRADE= 'S02'  
OR SGRADE = 'S03';

(iii) SELECT \*  
FROM EMPLOYEE  
WHERE DOJ BETWEEN '09-FEB-2006'  
AND '08-AUG-2009';

(iv) INSERT INTO EMPLOYEE VALUES  
(109, 'Harish Roy', 'HEAD-IT', 'S02',  
'09-SEP-2007', '21-APR-1983');

(b) (i)

COUNT (SGRADE)	SGRADE
1	S01
2	S02
3	S03

(ii)

MIN(DOB)	MAX(DOJ)
13-JAN-1980	12-FEB-2010

(iii)

NAME	SALARY
Abdul Ahmad	24000
Ravi Chander	32000

(iv)

SGRADE	SALARY+HRA
S02	44000

18. Consider the following tables WORKER and PAYLLEVEL and answer (a) and (b) parts of this question:

TABLE WORKER					
ECODE	NAME DOB	DESIGN	PLEVEL	DOJ	
11 AUG-1981	Radhe Shyam	Supervisor	P001	13-SEP-2004	23-
12 JUL-1987	Chander Nath	Operator	P003	22-FEB-2010	12-
13 OCT-1983	Fizza	Operator	P003	14-JUN-2009	14-
15 MAR-1984	Ahmeen Ahmad	Mechanic	P002	21-AUG-2006	13-
18 JUN-1983	Sanya	Clerk	P002	19-DEC-2005	09-

TABLE PAYLEVEL		
PLEVEL	PAY	ALLOWANCE
P001	26000	12000
P002	22000	10000
P003	12000	6000

(a) Write SQL commands for the following statements:

(i) To display the detail of all WORKER in descending order of DOB.

(ii) To display name and design of those WORKER, whose plevel is either P001 to P002.

(iii) To display the content of all the WORKER table, whose DOB is in between '19-JAN-1984' and '18-JAN-1987'.

(iv) To add a new row with the following:

19, 'Daya Kishore', 'Operator', 'P003', '19-JUN-2008', '11-JUL-1984'.

(b) Give the output of the following SQL queries:

(i) SELECT COUNT (PLEVEL), PLEVEL FROM WORKER GROUP BY PLEVEL;

(ii) SELECT MAX (DOB), MIN (DOJ) FROM WORKER;

(iii) SELECT NAME, PAY FROM WORKER W, PAYLEVEL P WHERE W. PLEVEL= P.LEVEL AND W. ECODE<13;

(iv) SELECT PLEVEL, PAY+ALLOWANCE FROM PLEVEL WHERE PLEVEL = 'P003';

Ans 18.

(a) (i) SELECT \*  
FROM WORKER  
ORDER BY DOB DESC;

(ii) SELECT NAME, DESIG;  
FROM WORKER  
WHERE PLEVEL = 'P001' OR PLEVEL = 'P002';

(iii) SELECT \*  
FROM WORKER  
WHERE DOB BETWEEN  
'19-JAN-1984' AND '18-JAN-1987';

(iv) INSERT INTO WORKER VALUES (19,  
'Daya Kishore', Operator, 'P003'  
'19-JUN-2008', '11-JUL-1984');

(b) (i)

COUNT (PLEVEL)	PLEVEL
1	P001
2	P002
3	P003

(ii)

MAX (DOB)	MIN (DOJ)
12-JUL-1987	13-SEP-2004

(iii)

NAME	PAY
Radhe Shyam	26000
Chander Nath	12000

(iv)

PLEVEL	PAY+ALLOWANCE
P003	18000

19. Consider the following tables STORE and SUPPLIERS and answer (a) and (b) parts of this question:

TABLE STORE					
iteemNo	Item	Scode	Qty	Rate	LastBuy
2005	Sharpener Classic	23	60	8	31-JUN-09
2003	Ball pen 0.25	22	50	25	01-FEB-09

2002	Gel Pen Premium	21	150	12	24-FEB-10
2006 09	Gel Pen Classic	21	250	20	11-MAY-
2001	Eraser Small	22	220	6	19-JAN-09
2004 09	Eraser Big	22	110	8	02-DEC-
2009 09	Ball Pen 0.5	21	180	18	03-NOV-

**TABLE SUPPLIERS**

Scode	Sname
21	Premium Stationers
23	Soft Plastics
22	Tetra Supply

- (a) Write SQL commands for the following statements:
- To display details of all the items in the Store table in ascending order of LastBuy.
  - To display ItemNo and Item name of those items from STORE table whose Rate is more than 15 Rupees.
  - To display the details of those items whose Supplier code (Scode) is 22 or Quantity in Store (Qty) is more than 110 from the table STORE.
  - To display minimum Rate of items for each supplier individually as per Scode from the table STORE.
- (b) Give the output of the following SQL queries:
- SELECT COUNT (DISTINCT Scode) FROM STORE;
  - SELECT Rate \* Qty FROM STORE WHERE ItemNo = 2004;
  - SELECT Item, Sname FROM Store S, SUPPLIERS P WHERE S. Scode = P. Scode AND ItemNo = 2006;
  - SELECT MAX (LastBuy) FROM STORE;

Ans 19.(a) (i) SELECT \*  
FROM STORE ORDER BY LastBuy;

(ii) SELECT itemNo, Item  
FROM STORE WHERE Rate>15;

(iii) SELECT \* FROM STORE  
WHERE Scode = 22 OR Qty >110;

(iv) SELECT MIN (Rate)  
FROM STORE GROUP BY Scode;

(b) (i) 

COUNT (DISTINCT Scode)
3

(ii) 

Rate * Qty
880

(iii) 

Item	Sname
Gel Pen Classic	Premier Stationers

(iv) 

MAX (Lastbuy)
24-FEB-10

20. Consider the following table GARMENT and FABRIC, Write SQL commands for the statements (i) to (iv) and give outputs for the SQL queries (v) to (viii).

**TABLE GARMENT**

<b>GCODE</b>	<b>DESCRIPTION</b>	<b>PRICE</b>	<b>FCODE</b>	
<b>READYDATE</b>				
10023	PENCIL SKIRT	1150	F 03	19-
DEC-08				
10001	FORMAL SHIRT	1250	F 01	12-
JAN-08				
10012	INFORMAL SHIRT	1550	F 02	06-
JUN-08				
10024	BABY TOP	750	F 03	07-
APR-07				
10090	TULIP SKIRT	850	F 02	31-
MAR-07				
10019	EVENING GOWN	850	F 03	06-
JUN-08				
10009	INFORMAL PANT	1500	F 02	20-
OCT-08				
10007	FORMAL PANT	1350	F 01	09-
MAR-08				
10020	FROCK	850	F 04	09-
SEP-07				
10089	SLACKS	750	F 03	20-
OCT-08				

**TABLE FABRIC**

<b>FCODE</b>	<b>TYPE</b>
F 04	POLYSTER
F 02	COTTON
F 03	SILK
F01	TERELENE

- (i) To display GCODE and DESCRIPTION of each GARMENT in descending order of GCODE.
- (ii) To display the details of all the GARMENT, which have READYDATE in between 08-DEC-07 and 16-JUN-08 (inclusive if both the dates).
- (iii) To display the average PRICE of all the GARMENT, which are made up of fabric with FCODE as F03.
- (iv) To display fabric wise highest and lowest price of GARMENT from GARMENT table. (Display FCODE of each GARMENT along with highest and lowest Price).
- (v) SELECT SUM (PRICE) FROM GARMENT WHERE FCODE = 'F01';
- (vi) SELECT DESCRIPTION, TYPE FROM GARMENT, FABRIC  
WHERE GARMENT, FCODE = FABRIC.FCOD E AND GARMENT.PRICE >=1260;
- (vii) SELECT MAX (FCODE) FROM FABRIC;
- (viii) SELECT COUNT (DISTINCT PRICE) FROM GARMENT;

Ans 20. (i) SELECT GCODE, DESCRIPTION  
FROM GARMENT ORDER BY GCODE DESC;

(ii) SELECT \* FROM GARMENT  
WHERE READY DATE BETWEEN '08-DEC-07'  
AND '16-JUN-08';

(iii) SELECT AVG (PRICE)  
FROM GARMENT WHERE FCODE = 'F03';

(iv) SELECT FCODE, MAX (PRICE), MIN (PRICE)  
FROM GARMENT GROUP BY FCODE;

(v) \_\_\_\_\_



	<b>SUM (PRICE)</b>	
	2600	
(vi)	<b>DESCRIPTION</b>	<b>TYPE</b>
	INFORMAL SHIRT	COTTON
	INFORMAL PANT	COTTON
	FORMAL PANT	TERELENE
(vii)	<b>MAX (FCODE)</b>	
	F04	
(vii)	<b>COUNT (DISTINCT PRICE)</b>	
	7	

21.

Consider the following DEPT and WORKER tables. Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii) :

Table : DEPT

DCODE	DEPARTMENT	CITY
D01	MEDIA	DELHI
D02	MARKETING	DELHI
D03	INFRASTRUCTURE	MUMBAI
D05	FINANCE	KOLKATA
D04	HUMAN RESOURCE	MUMBAI

Table : WORKER

WNO	NAME	DOJ	DOB	GENDER	DCODE
1001	George K	2013-09-02	1991-09-01	MALE	D01
1002	Ryma Sen	2012-12-11	1990-12-15	FEMALE	D03
1003	Mohitesh	2013-02-03	1987-09-04	MALE	D05
1007	Anil Jha	2014-01-17	1984-10-19	MALE	D04
1004	Manila Sahai	2012-12-09	1986-11-14	FEMALE	D01
1005	R SAHAY	2013-11-18	1987-03-31	MALE	D02
1006	Jaya Priya	2014-06-09	1985-06-23	FEMALE	D05

Note : DOJ refers to date of joining and DOB refers to date of Birth of workers.

- (i) To display Wno, Name, Gender from the table WORKER in descending order of Wno.
- (ii) To display the Name of all the FEMALE workers from the table WORKER.
- (iii) To display the Wno and Name of those workers from the table WORKER who are born between '1987-01-01' and '1991-12-01'.
- (iv) To count and display MALE workers who have joined after '1986-01-01'.
- (v) **SELECT COUNT(\*), DCODE FROM WORKER  
GROUP BY DCODE HAVING COUNT(\*)>1;**
- (vi) **SELECT DISTINCT DEPARTMENT FROM DEPT;**
- (vii) **SELECT NAME, DEPARTMENT, CITY FROM WORKER W,DEPT D WHERE  
W.DCODE=D.DCODE AND WNO<1003;**
- (viii) **SELECT MAX(DOJ), MIN(DOB) FROM WORKER;**

**Ans 21.**

(i) SELECT Wno,Name,Gender FROM Worker ORDER BY Wno DESC;

(ii) SELECT Name FROM Worker WHERE Gender='FEMALE';

(iii) SELECT Wno, Name FROM Worker  
WHERE DOB BETWEEN '19870101' AND '19911201';

(iv) SELECT COUNT(\*) FROM Worker  
WHERE GENDER='MALE' AND DOJ > '19860101';

(v) COUNT(\*) DCODE  
2 D01  
2 D05

(vi) Department  
MEDIA  
MARKETING  
INFRASTRUCTURE  
FINANCE  
HUMAN RESOURCE

(vii) NAME DEPARTMENT CITY  
George K MEDIA DELHI  
Ryma Sen INFRASTRUCTURE MUMBAI

(viii)  
MAX(DOJ) MIN(DOB)  
2014-06-09 1984-10-19

# ARRAY

## Arrays

### 2/3 Marks Questions

1. Write the definition of a function Alter(int A[], int N) in C++, which should change all the multiples of 5 in the array to 5 and rest of the elements as 0. For example, if an array of 10 integers is as

follows:

```
A[0] A[1] A[2] A[3] A[4] A[5] A[6] A[7] A[8] A[9]
55   43   20   16   39   90   83   40   48   25
```

After executing the function, the array content should be changed

as follow:

```
A[0] A[1] A[2] A[3] A[4] A[5] A[6] A[7] A[8] A[9]
5    0    5    0    0    5    0    5    0    5
```

Ans 1. void Alter(int A[ ],int N)

```
{
    for (int i=0;i<N;i++)
        if(A[i]%5==0)
            A[i]=5;
        else
            A[i]=0;
}
```

2. Write the definition of a function Alter(int A[], int N) in C++, which should change all the odd numbers in the array to 1 and even numbers as 0. For example, if an array of 10 integers is as

follows:

```
A[0] A[1] A[2] A[3] A[4] A[5] A[6] A[7] A[8] A[9]
55   43   20   16   39   90   83   40   48   25
```

After executing the function, the array content should be changed

as follow:

```
A[0] A[1] A[2] A[3] A[4] A[5] A[6] A[7] A[8] A[9]
1    1    0    0    1    0    1    0    0    1
```

Ans 2. void Alter(int A[ ],int N)

```
{
    for (int i=0;i<N;i++)
        if(A[i]%2==0)
            A[i]=0;
        else
            A[i]=1;
}
```

3. Write code for a function void oddEven (int s[],int N) in C++, to add 5 in all the odd values and 10 in all the even values of the array S.

e.g. If the original content of the array S is: 50 11 19 24 28.

The modified content will be : 60 16 24 34 38

```

Ans 3. void oddEven(int S[ ],int N)
{
    for (int i=0;i<N;i++)
    {
        if(S[i]%2==0)
            S[i]+=10;
        else
            S[i]+=5;
    }
}

```

4. Write a function in C++ TWOTOONE() which accepts two array X[ ], Y[ ] and their size n as argument. Both the arrays X[ ] and Y[ ] have the same number of elements. Transfer the content from two arrays X[ ], Y[ ] to array Z[ ]. The even places (0,2,4...) of array Z[ ] should get the contents from the array X[ ] and odd places (1,3,5...) of array Z[ ] should get the contents from the array Y[ ].

Example : If the X[ ] array contains 30,60,90 and the Y[ ] array contains 10,20,50. Then Z[ ] should contain 30,10,60,20,90,50.

Ans 4 void TWOTOONE(int X[], int Y[], int m, int n)

```

{
    int Z[30], i,k=0;
    for( i=0;i<=m-1,i++)
        { Z[k]=X[i];
          k=k+2;
        }
    k=1;
    for(i=0;i<=n-1;i++)
        { Z[k]=Y[i];
          k+=2;
        }
    cout<<"the resultant array is ";
    for(k=0;k<=m+n-1; k++)
        cout<<Z[k];
}

```

5. Write a code in C++ for a function void Convert ( int T[], int N) , which repositions all the elements of array by shifting each of them one to one position before and by shifting the first element to last.

e.g. if the content of array is

0	1	2	3
22	25	14	30

The changed array content will be:

0	1	2	3
---	---	---	---

25	14	30	22
----	----	----	----

Ans 5. void Covert (int T[], int N)

```
{ int temp=T[0];
for( i=0;i<(N-1);i++)
{
T[i]=T[i+1];
}
T[i]=temp;
}
```

6. Write a for a function void ChangeOver ( int P[], int N) in C++ , which repositions all the elements of array by shifting each of them to next position and shifting last element to first position.

e.g. if the content of array is

0	1	2	3
10	14	11	21

The changed array content will be:

0	1	2	3
21	10	14	11

Ans 6. void Change (int P[], int N)

```
{ int temp;
for( i=0;i<(N-1);i++)
{ temp=P[N-1];
P[N-1]=P[i];
P[i]=temp;
}
}
```

7.

Write a function SWAP2BEST (int ARR[], int Size) in C++ to modify the content of the array in such a way that the elements,

which are multiples of 10 swap with the value present in the very next position in the array.

For example :

i.e the content of array ARR is

90, 56, 45, 20, 34, 54

The content of array ARR should become

56, 90, 45, 34, 20, 54

Ans 7. void SWAP2BEST (int ARR[], int Size)

```
{
for(int i=0;i<(Size-2);i++)
if ( ARR[i]%10==0)
{ int temp= ARR[i];
ARR[i]=ARR[i+1];
```

```

        ARR[i+1]=temp;
        i++;
    }
}

```

8. Write a Get1From2( ) function in C++ to transfer the content from two arrays FIRST[ ] and SECOND[ ] to array ALL[ ]. The even places (0,2, 4,...) of array ALL[ ] should get the content from the array FIRST[ ] and odd places (1, 3, 5, ) of the array ALL[ ] should get the content from the array SECOND[ ].

Example:

If the FIRST[ ] array contains

30, 60, 90

And the SECOND[ ] array contains

10, 50, 80

The ALL[ ] array should contain

30, 10, 60, 50, 90, 80

Ans 8.        void Get1From2 (int ALL[],int FIRST[],int SECOND[],int N,int M)

```

{
for(int l=0,J=0,K=0;i<N+M; l++)
if (l%2==0)
ALL[l]=FIRST[J++];
else
ALL[l]=SECOND[K++];
}

```

9. Write a Get2From1( ) function in C++ to transfer the content from one arrays ALL[ ] to two arrays Odd[ ] and Even[ ]. The Even should contain values from places (0,2,4,.....) of ALL[ ] and Odd[ ] should contain values from places (1,3,5,.....).

Example:

If The ALL[ ] array contain

30, 10, 60, 50, 90, 80

Then the Even[ ] array should contains

30, 60, 90

And the ODD[ ] array should contains

10, 50, 80

Ans 9.        void Get2From1(int ALL[],int N)

```

{ int p,q,i,j=0,k=0;
if (N%2==0)
{ p=N/2; q=N/2;}
else
{ p=N/2; q=((n/2)+1); }
int *Odd=new int[p];
int *Even=new int[q];
for(i=0;i<(p+q);i++)

```

```

        { if(i%2==0)
          Even[j++]=ALL[i];
          else
          Odd[k++]=ALL[i];
        }
    }
}

```

10. Write a function CHANGE0 in C++, which accepts an array of integer and its size as parameters and divide all those array elements by 7 which are divisible by 7 and multiply other-array elements by 3.

**Sample Input Data of the array**

A[0]	A[1]	A[2]	A[3]	A[4]
21	12	35	42	18

**Content of the array after Calling CHANGE( ) function**

A[0]	A[1]	A[2]	A[3]	A[4]
3	36	5	6	54

Ans 10. void CHANGE (int A[ ], int N)

```

{
for(int l = 0; l<N; l++)
{
    if (A[l]%7 == 0)
    A [l] = A [l] /7;
    else
    A[l] = A[l] * 3;
}
}

```

11. Write a function REASSIGN0 in C++, which accepts an array of integers and its size as parameters and divide all those array elements by 5 which are divisible by 5 and multiply other array elements by 2.

**Sample Input Data of the array**

A[0]	A[1]	A[2]	A[3]	A[4]
20	12	15	60	32

**Content of the array after calling REASSIGN0 function**

A[0]	A[1]	A[2]	A[3]	A[4]
4	24	3	12	64

Ans 11. void REASSIGN (int Arr[ ], int Size)

```

{
for (int i=0;i<Size;i++)
if (Arr[i]%5==0)
Arr[i]/=5;
else
Arr[i]*=2;
}

```

```
}
```

12. Write a function in C++, which accepts an integer array and its size as arguments and swap the elements of every even location with its following odd location.

**Example :**

If an array of nine elements initially contains the elements as

2, 4, 1, 6, 5, 7, 9, 23, 10

then the function should rearrange the array as 4, 2, 6, 1, 7, 5, 23, 9, 10

Ans 12. void SwapArray(int A[ ], int N)

```
{
    int i,j,temp;
    for(i=0;i<N-1;i+=2)
    {
        temp=A[i];
        A[i]=A[i+1];
        A[i+1]=temp;
    }
}
```

13. Write a function in C++, which accepts an integer array and its size as parameters and rearranges the array in reverse.

**Example :**

If an array of nine elements initially

contains the elements as 4, 2, 5, 1, 6, 7, 8, 12, 10

Then the function should rearrange the array as

10, 12, 8, 7, 6, 1, 5, 2, 4

Ans 13. void receive(int A[ ], int size)

```
{
    int temp;
    for(i=0,j=size-1;i<size/2;i++,j--)
    {
        temp=A[i];
        A[i]=A[j];
        A[j]=temp;
    }
}
```

14. Write function in C++ which accepts an integer array and size as arguments and replaces elements having odd values with thrice its value and elements having even values with twice its value.

Example : if an array of five elements

initially contains elements as 3, 4, 5, 16, 9

The function should rearrange the content of the array as 9, 8, 75, 32, 27

Ans 14. void manipulate (int a[ ],int size)

```
{
    for (i=0;i<size;i++)
    {
```



```

if (a[i]%2= =1)
a[i]=a[i]*3;
else
a[i]=a[i]*2;
cout<<a[i]<<',';
}
}

```

15. Write a function in C++ which accepts an integer array and its size as arguments and exchanges the values of first half side elements with the second half side elements of the array.

Example :

If an array of 8 elements initial content as 2, 4, 1, 6, 7, 9, 23, 10

The function should rearrange array as 7, 9, 23, 10, 2, 4, 1, 6

```

Ans 15.. void exchange(int a[],int n)
{
    int i, mid,t,pos=0; mid=n/2;
    if(n%2!=0)
        pos=1;
    for(i=0;i<mid;i++)
    {
        t=a[i];
        a[i]=a[mid+pos+i];
        a[mid+pos+i]=t;
    }
}

```

16. Write a Function to Search for an element from Array A by Linear Search.

```

Ans 16.void Lsearch(int A[], int n, int Data)
{
    int I;
    for(I=0; I<n; I++)
    {
        if(A[I]==Data)
        {
            cout<<"Data Found at : "<<I;
        }
    }
    cout<<"Data Not Found in the array"<<endl;
}

```

17. Write a Function to Search for an element from Array A by Binary Search.

```

Ans 17.int BsearchAsc(int A[], int n, int data)
{
    int Mid,Lbound=0,Ubound=n-1,Found=0;
    while((Lbound<=Ubound) && !(Found))
    {
        Mid=(Lbound+Ubound)/2; //Searching The
Item
        if(data>A[Mid])

```

```

        Lbound=Mid+1;
    else if (data<A[Mid])
        Ubound=Mid-1;
    else
        Found++;
    }
    if (Found)
        return (Mid+1);           //returning location,
if present
    else
        return (-1);           //returning -1,if not
present
}

```

18. Write a function to Sort the array A by Bubble Sort.

Ans 18.

```

void BSort(int A[], int n)
{
    int I,J,Temp;
    for(I=0;I<n-1;I++) //sorting
    {
        for(J=0;J<(n-1-I);J++)
            if(A[J]>A[J+1])
            {
                Temp=A[J]; //swapping
                A[J]=A[J+1];
                A[J+1]=Temp;
            }
    }
}

```

19. Write a function to Sort the array A by Selection Sort.

Ans 19.

```

void SSort(int A[], int n)
{
    int I,J,Temp,Small;
    for(I=0;I<n-1;I++)
    {
        Small=I;
        for(J=I+1;J<n;J++) //finding the smallest element
            if(A[J]<A[Small])
                Small=J;
        if(Small!=I)
        {
            Temp=A[I]; //Swapping
            A[I]=A[Small];
            A[Small]=Temp;
        }
    }
}

```

20. Write a function to Sort the array A by Insertion Sort.

Ans 20.

```

void ISort(int A[], int n)
{
    int I,J,Temp;
    for(I=1;I<n;I++) //sorting

```

```

    {
        Temp=A[I];
        J=I-1;
        while((Temp<A[J]) && (J>=0))
        {
            A[J+1]=A[J];
            J--;
        }
        A[J+1]=Temp;
    }
}

```

21. What will be the status of the following list after fourth pass of bubble sort and fourth pass of selection sort used for arranging the following elements in descending order?

14, 10, -12, 9, 15, 35

Ans 21. **Bubble Sort**

14, 10, -12, 9, 15, 35 (Original Content)

i. 14, 10, 9, 15, 35, -12

ii. 14, 10, 15, 35, 9, -12

iii. 14, 15, 35, 10, 9, -12

iv. 15, 35, 14, 10, 9, -12 (Unsorted status after 4th pass)

**Selection Sort**

14, 10, -12, 9, 15, 35 (Original Content)

i. 35, 10, -12, 9, 15, 14

ii. 35, 15, -12, 9, 10, 14

iii. 35, 15, 14, 9, 10, -12

iv. 35, 15, 14, 10, 9, -12

22. A two dimensional array P[20] [50] is stored in the memory along

the row with each of its element occupying 4 bytes, find the address of the element P[10] [30], if the element P[5] [5] is stored at the memory location 15000.

Ans 22.  $Loc(P[I][J])$  along the row =  $BaseAddress + W [(I-LBR) * C + (J-LBC)]$

(where C is the number of columns,  $LBR=LBC=0$ )

$LOC(P[5][5]) = BaseAddress + W * [I * C + J]$

$15000 = BaseAddress + 4 * [5 * 50 + 5]$

$= BaseAddress + 4 * [250 + 5]$

$= BaseAddress + 4 * 255$

$= BaseAddress + 1020$

$BaseAddress = 15000 - 1020$

$= 13980$

$LOC(P[10][30]) = 13980 + 4 * [10 * 50 + 30] = 13980 + 4 * 530$

$= 13980 + 2120$

$= 16100$

23. A two dimensional array ARR[50][20] is stored in the memory along the row with each of its elements occupying 4

bytes. Find the address of the element ARR[30][10], if the element ARR[10][5] is stored at the memory location 15000.

**Ans 23.**  $\text{Loc}(\text{ARR}[I][J])$  along the row =  $\text{BaseAddress} + W[(I - \text{LBR}) * C + (J - \text{LBC})]$

(where C is the number of columns,  $\text{LBR} = \text{LBC} = 0$ )

$\text{LOC}(\text{ARR}[10][5]) = \text{BaseAddress} + W [ I * C + J ]$

$15000 = \text{BaseAddress} + 4[10 * 20 + 5]$

$= \text{BaseAddress} + 4[200 + 5]$

$= \text{BaseAddress} + 4 \times 205$

$= \text{BaseAddress} + 820$

$\text{BaseAddress} = 15000 - 820$

$= 14180$

$\text{LOC}(\text{ARR}[30][10]) = 14180 + 4[30 * 20 + 10]$

$= 14180 + 4 * 610 = 14180 + 2440$

$= 16620$

OR

$\text{LOC}(\text{ARR}[30][10]) = \text{LOC}(\text{ARR}[10][5]) + W[(I - \text{LBR}) * C + (J - \text{LBC})]$

$= 15000 + 4[(30 - 10) * 20 + (10 - 5)]$

$= 15000 + 4[20 * 20 + 5]$

$= 15000 + 4 * 405$

$= 15000 + 1620$

$= 16620$

24. An array T [25][20] is stored along the row in the memory with each element requiring 2 bytes of storage. If the base address of array T is 42000, find out the location of T[10][15]. Also, find the total number of elements present in this array.

**Ans 24**  $T[i][j] = \text{Base Addr} + [i * \text{number of columns} + j] * \text{size of each element}$

$T[10][15] = 42000 + [(10 * 20) + 15] * 2$

$= 42000 + 215 * 2$

$= 42000 + 430 = 42430$

Total number of elements in array is =  $25 * 20 = 500$

25. An array A[20][30] is stored along the row in the memory with each element requiring 4 bytes of storage. If the base address of array A is 32000, find out the location of A[15][10]. Also, find the total number of elements present in this array.

**Ans 25.**  $T[i][j] = \text{Base Addr} + [i * \text{number of columns} + j] * \text{size of each element}$

$A[15][10] = 32000 + [(15 * 30) + 10] * 4$

$= 32000 + 460 * 4$

$= 32000 + 1840 = 33840$

Total number of elements in array is =  $20 * 30 = 600$

26. Given an array A[10][12] whose base address is 10000. Calculate the memory location of A[2][5] if each element occupies 4 bytes and array is stored column-wise.

Ans 26.  $B=10000, W=4, N=10, I=2, J=5$

$$A[I][J]=B+W[(I-LBR)+(J-LBC)*N]$$

$$\begin{aligned}A[2][5]&=10000+4(2+10*5) \\ &=10000+4(52) \\ &=10000+208=10208\end{aligned}$$

27. An array P[15][10] is stored along the column in the memory with each element requiring 4 bytes of storage. If the base address of array P is 14000, find out the location of P[8][5].

Ans 27.  $B=14000, W=4, N=15, I=8, J=5$

$$P[I][J]=B+W[(I-LBR)+(J-LBC)*N]$$

$$\begin{aligned}P[8][5]&=14000+4(8+5*15) \\ &=14000+4(83) \\ &=14000+332=14332\end{aligned}$$

28. An array T[15][10] is stored along the row in the memory with each element requiring 8 bytes of storage. If the base address of array T is 14000, find out the location of T[10][7].

Ans 28. Address of  $T[i][j]=\text{address of } T[0][0]+(i*\text{number of columns present in array } +j)*\text{sizeof(element)}$

$$\begin{aligned}\text{Address of } T[10][7]&=14000+(10*10+7)*8 \\ &=14000+(107)*8 \\ &=14000+856 \\ &=14856\end{aligned}$$

29. An array T[20][10] is stored in the memory along the column with each of the element occupying 2 bytes, find out the memory location of T[10][5], if an element T[2][9] is stored at location 7600.

Ans 29.  $T[2][9]=\text{Base addr}+2[2+9*20]$

$$7600=\text{Base addr}+2*(182)$$

$$\text{Base addr}=7600-364=7236$$

$$T[10][5]=7236+2(10+5*20)$$

$$=7236+110*2$$

$$=7456$$

30. An array P[20][50] is stored in the memory along the column with each of its element occupying 4 bytes, find out the location of P[15][10], if P[0][0] is stored at 5200.

Ans 30. Assuming  $LBR=LBC=0$

$$B=5200$$

$$W=4 \text{ bytes}$$

Number of Rows (N)=20  
 Number of Columns (M)=50  
 $LOC(Arr[I][J]) = B + (I + J*N)*W$   
 $LOC(Arr[15][10]) = 5200 + (15 + 10*20)*4$   
 $= 5200 + (215*4)$   
 $= 5200 + 860$   
 $= 6060$

31. An array G[50][20] is stored in the memory along the row with each of its element occupying 8 bytes, find out the location of G[10][15], if P[0][0] is stored at 4200.

Ans 31. Assuming LBR=LBC=0  
 B=4200  
 W=8 bytes  
 Number of Rows (N)=50  
 Number of Columns (M)=20  
 $LOC(Arr[I][J]) = B + (I*M + J)*W$   
 $LOC(Arr[10][15]) = 4200 + (10*20 + 15)*8$   
 $= 4200 + (215*8)$   
 $= 4200 + 1720$   
 $= 5920$

32. An array P[50][60] is stored in the memory along the column with each of the element occupying 2 bytes, find out the memory location for the element P[10][20], if the Base Address of the array is 6800.

Ans 32.  $Loc(P[I][J]) = Base(P) + W(I + J*M)$  i  $Loc(P[10][20])$   
 $= Base(P) + 2(10 + 20*50)$   
 $Loc(P[10][20]) = 6800 + 2(10 + 20*50)$   
 $= 6800 + 2(10 + 1000)$   
 $= 6800 + 2*1010$   
 $= 6800 + 2020$   
 $= 8820$

**OR**

$Address\ of\ P[i][j] = BaseAddress + W((i - L1) + (j - L2)*M)$   
 $Address\ of\ P[10][20] = 6800 + 2((10 - 0) + (20 - 0)*50)$   
 $= 6800 + 2 \times 1010$   
 $= 6800 + 2020$   
 $= 8820$

33. An array T[90][100] is stored in the memory along the column with each of the elements occupying 4 bytes. Find out the memory location for the element T[10][40], if the Base Address of the array is 7200.

Ans 33.  $Loc(T[I][J]) = Base(T) + W(I + J*N)$  where N is the number of rows, LBR=LBC=0  
 $= 7200 + 4[10 + 40 \times 90]$   
 $= 7200 + 4[10 + 3600]$   
 $= 7200 + 4 \times 3610$   
 $= 7200 + 14440$

$$= 21640$$

34. An array S[40][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the base address and address of element S[20][15], if an element S[15][10] is stored at the memory location 7200.

Ans 34.

$$\begin{aligned} \text{Loc}(S[I][J]) &= \text{Base}(S) + W(I+J*N) \\ \text{Loc}(S[15][10]) &= \text{Base}(S) + 4(15+10*40) \\ \text{Base}(S) &= 7200 - 4*415 \\ \text{Base}(S) &= 7200 - 1660 \\ \text{Base}(S) &= 5540 \\ \text{Loc}(S[20][15]) &= \text{Base}(S) + 4(20+15*40) \\ \text{Loc}(S[20][15]) &= 5540 + 4(20+15*40) \\ &= 5540 + 4(20+600) \\ &= 5540 + 4*620 \\ &= 5540 + 2480 \\ &= 8020 \end{aligned}$$

35. An array Arr[50][10] is store in the memory along the row with each element occupying 2 bytes. Find out the Base address of the location Arr[20][50], if the location Arr[10][25] is stored at the address 10000.

Ans 35.

$$\begin{aligned} &\text{Assuming LBR=LBC=0 S=2 bytes} \\ \text{Number of Rows (N)} &= 50 \\ \text{Number of Columns (M)} &= 10 \\ \text{LOC (Arr [I] [J])} &= B + (I*M+J)*S \\ \text{LOC (Arr [10] [25])} &= B + (10*10+25)*2 \\ 10000 &= B + (100+25)*2 \\ B &= 10000 - 250 \\ B &= 9750 \\ \text{LOC (Arr [20] [50])} &= 9750 + (20*10+50)*2 \\ &= 9750 + (250*2) \\ &= 9750 + 500 \\ &= 10250 \end{aligned}$$

36. An array VAL[1...15][1...10] is stored in the memory with each element requiring 4 bytes of storage. If the base address of the array VAL is 1500, determine the location of VAL[12][9] when the array VAL is stored Row wise.

Ans 36. Given Data: VAL[1...15][1...10]  
 Word Length (W) = 4 Bytes  
 Base Address of VAL(B) = 1500

$$\begin{aligned} \text{VAL}[12][9] &= ? \\ C &= \text{Total No of Columns} = 10 \\ R &= \text{Total No of Rows} = 15 \\ Lr &= \text{Least Row} = 1 \end{aligned}$$

Lc = Least Column=1

**Row Major:**

**Address of an element (I,J) in row major = B + W ( C (I-Lr) + (J - Lc) )**

$$\begin{aligned}\text{VAL [12][9]} &= 1500 + 4 (10 * (12-1) + (9-1)) \\ &= 1500 + 4 (10 * 11+8) \\ &= 1500 + 4 (118) \\ &= 1500 + 472 \\ &= 1972.\end{aligned}$$

37. An array VAL[1...15][1...10] is stored in the memory with each element requiring 4 bytes of storage. If the base address of the array VAL is 1500, determine the location of VAL[12][9] when the array VAL is stored Column wise.

Ans **37.** Given Data: VAL[1...15][1...10]  
Word Length (W) = 4 Bytes  
Base Address of VAL(B) = 1500

VAL[12][9] = ?

C = Total No of Columns=10

R = Total No of Rows=15

Lr = Least Row=1

Lc = Least Column=1

**Column Major:**

**Address of an element (I,J) in column major**

**= B + W ( (I-Lr) + R(J - Lc) )**

$$\begin{aligned}\text{VAL [12][9]} &= 1500 + 4 ((12-1) + 15 * (9-1)) \\ &= 1500 + 4 (11 + 15 * 8) \\ &= 1500 + 4 ( 11+ 120) \\ &= 1500 + 4 * 131 \\ &= 1500 + 524 \\ &= 2024.\end{aligned}$$

38. An array S[40][30] is stored in the memory along the **row** with each of the element occupying 2 bytes, find out the memory location for the element S[20][10], if an element S[15][5] is stored at the memory location 5500.

Ans 38. Given, W(Word Length) = 2 R(Number of Rows) =40

C(Number of Columns) =30

Lr = Least Row = 0

Lc = Least Column = 0

Loc(S[15][5]) =5500

**Address of an element (I,J) in row major = B + W ( C (I-Lr) + (J - Lc) )**

$$\text{Loc(S[15][5])} = \text{Base(S)} + 2 * (30 * (15-0) + (5-0))$$

$$5500 = \text{Base(S)} + 2 * (30 * 15 + 5)$$

$$5500 = \text{Base(S)} + 2 * (450 + 5)$$

$$\text{Base(S)} = 5500 - 910$$

$$\text{Base(S)} = 4590$$

$$\text{Loc(S[20][10])} = 4590 + 2 * (30 * (20-0) + (10-0))$$



```
=4590+2*(30*20+10)
=4590+2*(600+10)
=4590+1220
= 5810
```

39. Write a function REVCOL (int P[][5], int N, int M) in C++ to display the content of a two dimensional array, with each column content in reverse order.

Note: Array may contain any number of rows.

For example, if the content of array is as follows:

```
15 12 56 45 51
13 91 92 87 63
11 23 61 46 81
```

The function should display output as:

```
11 23 61 46 81
13 91 92 87 63
15 12 56 45 51
```

Ans 39.

```
void REVCOL(int P[][5],int N,int M)
{
    for(int I=N-1;I>=
0;I)
    {
        for(int J=0;J<M;J++)
            cout<<P[I][J];
        cout<<endl;
    }
}
```

40. Write a function REVROW(int P[][5],int N, int M) in C++ to display the content of a two dimensional array, with each row content in reverse order.

For example, if the content of array is as follows:

```
15 12 56 45 51
13 91 92 87 63
11 23 61 46 81
```

The function should display output as:

```
51 45 56 12 15
63 87 92 91 13
81 46 61 23 81
```

Ans 40. void REVROW(int P[][5],int N,int M)

```
{
    for(int I=0; I<N; I++)
    { for(int J=M-1;
J>=0; J)
        cout<<P[I][J];
        cout<<endl;
    }
}
```

41. Write a user-defined function SumLast3(int A[][4], int N, int M) in C++ to find and display the sum of all the values, which are ending with 3 (i.e. Unit place is 3). For example if the content of array is:

33	13	92
99	3	12

The output should be 49

```

Ans 41. void SumLast3(int A[][4], int N,int M)
        { int S=0;
          for(int i=0;i<N;i++)
            {
              for( int j=0;j<M;j++)
                { int r=A[i][j]%10;
                  if(r==3)
                    S+=A[i][j];
                }
            }
          cout<<S;
        }

```

42. Write a user-defined function AddEnd2(int A[][4],int N,int M) in C++ to find and display the sum of all the values, which are ending with 2 (i.e., units place is 2). For example if the content of array is:

12	16	32
19	5	2

The output should be 46

```

Ans 42. void AddEnd2(int A[][4], int N,int M)
        { int S=0;
          for(int i=0;i<N;i++)
            {
              for( int j=0;j<M;j++)
                { if((A[i][j]%10)==2)
                    S+=A[i][j];
                }
            }
          cout<<S;
        }

```

43. Write a function in C++ which accepts a 2D array of integers and its size arguments and displays the elements which lie on minor diagonal. [Top right to bottom left diagonal]

[Assuming the 2D array to be square matrix with odd dimension i.e. 3 x 3, 5 x 5, 7, x 7, etc ...]

For example

If the 2D array is

6 7 8

1 3 6

7 9 3

The following should be displayed :

8

3

7

Ans 43.

```
void show( int a[5][5],int r,int c)
{
    for(int i=0;i<r;i++)
    { for(int j=0;j<c;j++)
        if((i+j==r-1))
        cout<<a[i][j];
        cout<<endl;
    }
}
```

44. Write a user defined function display (int A[][4], int N,int M) in C++ to find and display all numbers, which are divisible by 10.

e.g. if the content of array is :

45	50	60
10	3	15

Then output should be 50 60 10

```
Ans 44. void display(int A[][4], int N,int M)
{ int i,j;
  for( i=0;i<N;i++)
    for(j=0;j<M;j++)
      if( A[i][j]%10==0)
        cout<<A[i][j]<<" ";
}
```

45. Write a function ALTERNATE (int A[][3],int N,int M) in C++ to display all alternate element from two-dimensional array A (starting from A[0][0]).

e.g. if the Array is containing:

12	13	14
15	59	53
35	36	34

The output will be:

12 14 59 35 34

```
Ans 45. void Alternate (int A[][3], int N,int M)
{ int i,j;
  for( i=0;i<N;i++)
  {
      if(i%2==0)
        j=0;
      else j=1;
      While(j<M)
      { cout<<A[i][j]<<' \t';
        j+=2;
      }
  }
}
```

46. Write a COLSUM( ) function in C++ to find sum of each column of a NxM Matrix.

```
Ans 46. void COLSUM(int A[ ][100], int N, int M)
{ int SUMC;
```

```

for (int j=0; j<M; j++)
{ SUMC = 0;
for (int i=0; i<N; i++)
SUMC = SUMC + A[i][j] ;
cout<< "Sum of Column "<<j+1<<" = "<<SUMC<<endl ;
}
}

```

47. Write a ROWSUM( ) function in C++ to find sum of each row of a rxc Matrix.

Ans 47. void ROWSUM(int a[][100], int r, int c)

```

{ int i,j;
for(i=0;i<r;i++)
{ int s=0;
for(j=0;j<c;j++)
s+=a[i][j];
cout<<"sum="<<s<<endl;
}
}

```

48. Write a DSUM function in C++ to find the sum of diagonal element of a n\*n matrix.

Ans 48. void DSUM( int a[][3], int n)

```

{ int i,j;
int s=0;
for(i=0;i<n;i++)
s+=a[i][i];
cout<<"sum of upper diagonal="<<s<<endl;

```

```

int s1=0;
for(i=0;i<n;i++)
for(j=0;j<n;j++)
if((i+j==n-1))
s1+=a[i][j];
cout<<"sum of lower diagonal="<<s1;

```

```

}

```

49. Write a user defined function in C++ to display the multiplication of row elements of two dimensional array A[4][6] containing integers.

Ans 49. void RowMulti(int A[4][6])

```

{ int Mul[4];
for(int i=0;i<4;i++)
{ Mul[i]=1;
for(int j=0;j<6;j++)
Mul[i]*=A[i][j];
cout<<"Product of row"<<i+1<<"="<<Mul[i]<<endl;
}
}

```

50. Write a user defined function in C++ to display the sum of row elements of two dimensional array A[5][6] containing integers.

```
Ans 50. void RowSum(int A[5][6])
        { int SUMC[5];
          for(int i=0;i<5;i++)
          { SUMC[i]=0;
            for(int j=0;j<6;j++)
            SUMC[i]+=A[i][j];
            cout<<"Sum of row"<<i+1<<"="<< SUMC[i]<<endl;
          }
        }
```

51. Write a function in C++ to print the product of each column of a two dimensional integer array passed as the argument of the function.

Explain: if the two dimensional array contains

```
1 2 4
3 5 6
4 3 2
2 1 5
```

Then the output should appear as:

Product of Column 1 = 24

Product of Column 2 = 30

Product of Column 3 = 240

```
Ans 51. void ColProd(int A[4][3],int r,int c)
        { int Prod[C],i,j;
          for(j=0;j<c;j++)
          { Prod[j]=1;
            for(i=0;i<r;i++)
            Prod[j]*=A[i][j];
            cout<<"Product of Column" <<j+1<<"="<<Prod[j]<<endl;
          }
        }
```

52. Write a function in C++ which accepts a 2D array of integers and its size as arguments and display the elements which lie on diagonals.

[Assuming the 2D Array to be a square matrix with odd dimension i.e., 3 x 3, 5 x 5, 7 x 7 etc...]

Example, if the array content is

```
5 4 3
6 7 8
1 2 9
```

Output through the function should be:

Diagonal One: 5 7 9

Diagonal Two: 3 7 1

```
Ans 52. const int n=5;
        void Diagonals(int A[n][n], int size)
        {
```

```

int i,j;
cout<<"Diagonal One:";
for(i=0;i<n;i++)
cout<<A[i][i]<<" ";
cout<<"\n Diagonal Two:"
for(i=0;i<n;i++)
cout<<A[i][n-(i+1)]<<" ";
}

```

53. Write a function in C++ which accepts a 2D array of integers and its size as arguments and display the elements of middle row and the elements of middle column.

[Assuming the 2D Array to be a square matrix with odd dimension i.e., 3 x 3, 5 x 5, 7 x 7 etc...]

Example, if the array content is

```

3 5 4
7 6 9
2 1 8

```

Output through the function should be:

Middle Row: 7 6 9

Middle Column: 5 6 1

Ans 53.

```

const int S=7; // or it may be 3 or 5
int DispMRowMCol(int Arr[S][S],int S)
{ int mid=S/2; int i; //Extracting middle row
cout<<"\n Middle Row:";
for(i=0;i<S;i++)
cout<<Arr[mid][i]<<" ";
//Extracting middle column
cout<<"\n Middle Column:";
for(i=0;i<S;i++)
cout<<Arr[i][mid]<<" ";
}

```

54. Write a function int ALTERSUM (int B[ ][5], int N, int M in C++ to find and return the sum of elements from all alternate elements of a two-dimensional array starting from B[0][0].

Ans 54.

```

int ALTERSUM(int B[ ][5] ,int N,int M)
{
int Sum=0;
for (int I=0;I<N;I++)
for (int J=(I%2==0)?0:1;J<M;J+=2)
Sum+=B[I][J] ;
return Sum;
}

```

# BOOLEAN ALGEBRA

## BOOLEAN ALGEBRA

### 1 MARK QUESTIONS

1. Write the Sum of Product form of the function  $F(P, Q, R)$  for the following truth table representation of  $F$ :

$P$	$Q$	$R$	$F$
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

1.

Sol	$P$	$Q$	$R$	$F$	Minterm
0	0	0	0	1	$P'Q'R'$
0	0	0	1	0	$P'Q'R$
0	0	1	0	0	$P'QR'$
0	0	1	1	1	$P'QR$
1	1	0	0	0	$PQ'R'$
1	1	0	1	0	$PQ'R$
1	1	1	0	1	$PQR'$
1	1	1	1	1	$PQR$

Sum of Product form of function

$F(P, Q, R)$  is

$$F(P, Q, R) = P'Q'R' + P'QR + PQ'R' + PQR$$

2. Write the Product of Sum form of the function  $F(X, Y, Z)$  for the following truth table representation of  $F$ :

$X$	$Y$	$Z$	$F$
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

SOL

$X$	$Y$	$Z$	$F$	Maxterm
0	0	0	1	$X + Y + Z$
0	0	1	0	$X + Y + Z'$
0	1	0	0	$X + Y' + Z$
0	1	1	1	$X + Y' + Z'$

1	0	0	0	$X' + Y + Z$
1	0	1	0	$X' + Y + Z'$
1	1	0	1	$X' + Y' + Z$
1	1	1	1	$X' + Y' + Z'$

So,  $F = (X + Y + Z'). (X + Y' + Z).$   
 $(X' + Y + Z). (X' + Y + Z').$

3. Write the Product of Sum of the function  $G(U,V,W)$  for the following truth table representation of G:

$U$	$V$	$W$	$G$
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

SOL

$U$	$V$	$W$	$G$	Maxterm
0	0	0	1	$U + V + W$
0	0	1	0	$U + V + W'$
0	1	0	1	$U + V' + W$
0	1	1	0	$U + V' + W'$
1	0	0	1	$U' + V + W$
1	0	1	0	$U' + V + W'$
1	1	0	0	$U' + V' + W$
1	1	1	1	$U' + V' + W'$

To get the Product of Sum form, we need to product maxterms for all those input combinations that product output as 0. Thus,  $G(U, V, W) = (U + V + W'). (U + V' + W').$

$(U' + V + W'). (U' + V' + W)$

4. Write the Product of Sum form of the function  $G(U, V, W)$  for the following truth table representation of G:

$U$	$V$	$W$	$G(U, V, W)$
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0



SOL

<i>U</i>	<i>V</i>	<i>W</i>	<i>G</i>	Maxterm
0	0	0	0	$U + V + W$
0	0	1	1	$U + V + W'$
0	1	0	0	$U + V' + W$
0	1	1	1	$U + V' + W'$
1	0	0	1	$U' + V + W$
1	0	1	0	$U' + V + W'$
1	1	0	1	$U' + V' + W$
1	1	1	0	$U' + V' + W'$

To get the Product of Sum (POS) form, we need to product maxterms for all those input combinations that produce output as 0. Thus,

$$G(U, V, W) = (U + V + W).(U + \overline{V} + W).(\overline{U} + V + \overline{W}).(\overline{U} + \overline{V} + \overline{W})$$

5. Write the Sum of Product form of the function  $F(A, B, C)$  for the following truth table representation of  $F$ :

<i>A</i>	<i>B</i>	<i>C</i>	<i>F</i>
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

SOL

<i>A</i>	<i>B</i>	<i>C</i>	<i>F</i>	Minterm
0	0	0	0	$A'BC'$
0	0	1	0	$A'B'C$
0	1	0	1	$A'BC'$
0	1	1	1	$A'BC$
1	0	0	1	$AB'C'$
1	0	1	0	$AB'C$
1	1	0	0	$ABC'$
1	1	1	1	$ABC$

To get the SOP form, we need to sum minterms for all those input combinations that produce output

as 1. Thus,

$$F(A,B,C) = A'BC' + A'BC + AB'C + ABC$$

6. Write the POS form of boolean function  $G$ , which is represented in a truth table as follows:

<i>A</i>	<i>B</i>	<i>C</i>	<i>G</i>
----------	----------	----------	----------

0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

*SOL*

<b>A</b>	<b>B</b>	<b>C</b>	<b>G</b>	<b>Maxterm</b>
0	0	0	0	$A + B + C$
0	0	1	1	$A + B + \bar{C}$
0	1	0	1	$A + \bar{B} + C$
0	1	1	0	$A + B + \bar{C}$
1	0	0	0	$\bar{A} + B + C$
1	0	1	0	$\bar{A} + B + \bar{C}$
1	1	0	1	$\bar{A} + \bar{B} + C$
1	1	1	1	$\bar{A} + \bar{B} + \bar{C}$

To get the Product of Sum (POS) form, we need to product maxterms for all those input combinations that produce output as 0. Thus,

$$G(A, B, C) = (A + B + C) \cdot (A + \bar{B} + \bar{C}) \cdot (\bar{A} + B + C) \cdot (\bar{A} + B + \bar{C})$$

7. Write the SOP form of Boolean function  $F$ , which is represented in a truth table as follows:

$X$	$Y$	$Z$	$F$
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

*SOL*

$X$	$Y$	$Z$	$F$	<b>Minterm</b>
0	0	0	1	$\bar{X} + \bar{Y} + \bar{Z}$
0	0	1	0	$\bar{X} + Y + Z$
0	1	0	1	$\bar{X} + Y + \bar{Z}$
0	1	1	0	$\bar{X} + Y + Z$
1	0	0	1	$X + \bar{Y} + \bar{Z}$
1	0	1	0	$X + Y + Z$
1	1	0	0	$X + Y + \bar{Z}$
1	1	1	1	$X + Y + Z$

To get the SOP form, we need to sum minterms for all those input combinations that produce outputs as 1. Thus,

$$F(X, Y, Z) = (\overline{X} \cdot \overline{Y} \cdot \overline{Z}) + (\overline{X} \cdot Y \cdot \overline{Z}) + (X \cdot \overline{Y} \cdot \overline{Z}) + (X \cdot Y \cdot Z)$$

8. Write the POS form of a boolean function  $F$ , which is represented in truth table as follows:

$A$	$B$	$C$	$F$
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

SOL

$A$	$B$	$C$	$F$	Maxterm
0	0	0	0	$A + B + C$
0	0	1	1	$A + B + \overline{C}$
0	1	0	1	$A + \overline{B} + \overline{C}$
0	1	1	0	$\overline{A} + B + C$
1	0	0	1	$\overline{A} + B + \overline{C}$
1	0	1	0	$\overline{A} + \overline{B} + C$
1	1	0	0	$\overline{A} + \overline{B} + C$
1	1	1	1	$\overline{A} + \overline{B} + \overline{C}$

To get the POS form, we need to product maxterms for all those input combinations that produce output as 0. Thus,

$$F(A, B, C) = (A + B + C) \cdot (A + \overline{B} + \overline{C}) \cdot (\overline{A} + B + \overline{C}) \cdot (\overline{A} + \overline{B} + C)$$

9. Write the SOP form of a boolean function  $F$ , which is represented in a truth table as follows:

$A$	$B$	$C$	$F$
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

SOL

$A$	$B$	$C$	$F$	Minterm
0	0	0	1	$\overline{A} \cdot \overline{B} \cdot \overline{C}$
0	0	1	0	$\overline{A} \cdot \overline{B} \cdot C$

0	1	0	0	$\overline{A} . \overline{B} . C$
0	1	1	1	$A . \overline{B} . \overline{C}$
1	0	0	0	$A . \overline{B} . C$
1	0	1	0	$A . \overline{B} . C$
1	1	0	1	$A . B . \overline{C}$
1	1	1	1	$A . B . C$

To get the SOP form, we need to sum minterms for all those input combinations that produce output as 1. Thus,

$$F(A, B, C) = (\overline{A} . \overline{B} . C) + (\overline{A} . B . C) + (A . \overline{B} . C) + (A . B . C)$$

10. Write the SOP form of a boolean function  $F$ , which is represented in a truth table as follows:

$X$	$Y$	$Z$	$F(X, Y, Z)$
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

$X$	$Y$	$Z$	$F(X, Y, Z)$	<b>Minterm</b>
0	0	0	1	$\overline{X} + \overline{Y} + \overline{Z}$
0	0	1	1	$\overline{X} + Y + Z$
0	1	0	0	$\overline{X} + Y + \overline{Z}$
0	1	1	1	$\overline{X} + Y + Z$
1	0	0	1	$X + \overline{Y} + \overline{Z}$
1	0	1	0	$X + Y + \overline{Z}$
1	1	0	0	$X + Y + \overline{Z}$
1	1	1	1	$X + Y + Z$

To get the SOP form, we need to sum minterms for all those input combinations that produce output as 1. Thus,

$$F(X, Y, Z) = (\overline{X} . \overline{Y} . \overline{Z}) + (\overline{X} . \overline{Y} . Z) + (\overline{X} . Y . Z) + (X . \overline{Y} . \overline{Z}) + (X . Y . Z)$$

11. Write the POS form of boolean function  $H$ , which is represented in a truth table as follows:

$X$	$Y$	$Z$	$H$
0	0	0	1
0	0	1	0
0	1	0	1

0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

SOL

<i>X</i>	<i>Y</i>	<i>Z</i>	<i>H</i>	<b>Maxterm</b>
0	0	0	1	$X + Y + Z$
0	0	1	0	$X + \underline{Y} + Z$
0	1	0	1	$X + \underline{Y} + \underline{Z}$
0	1	1	1	$\underline{X} + Y + Z$
1	0	0	1	$\underline{X} + Y + \underline{Z}$
1	0	1	0	$\underline{X} + \underline{Y} + Z$
1	1	0	0	$\underline{X} + \underline{Y} + \underline{Z}$
1	1	1	1	$X + Y + Z$

To get the POS form, we need to maxterms for all those input combinations that produce output as 0. Thus,

$$H(X, Y, Z) = (X + Y + Z) \cdot (\underline{X} + Y + Z) \cdot (\underline{X} + \underline{Y} + Z)$$

12. Write the SOP form of boolean function G, which is represented in truth table as follows:

<i>P</i>	<i>Q</i>	<i>R</i>	<i>G</i>
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

SOL

<i>P</i>	<i>Q</i>	<i>R</i>	<i>G</i>	<b>Minterm</b>
0	0	0	0	$\underline{P} \cdot \underline{Q} \cdot \underline{R}$
0	0	1	0	$\underline{P} \cdot \underline{Q} \cdot R$
0	1	0	1	$\underline{P} \cdot Q \cdot \underline{R}$
0	1	1	1	$\underline{P} \cdot Q \cdot R$
1	0	0	1	$P \cdot \underline{Q} \cdot \underline{R}$
1	0	1	0	$P \cdot \underline{Q} \cdot R$
1	1	0	1	$P \cdot Q \cdot \underline{R}$
1	1	1	1	$P \cdot Q \cdot R$

To get the SOP form, we need to sum minterms for all those combinations that produce output as 1. Thus,

$$G(P, Q, R) = (\underline{P} \cdot \underline{Q} \cdot \underline{R}) + (\underline{P} \cdot \underline{Q} \cdot R) + (P \cdot \underline{Q} \cdot \underline{R}) + (P \cdot Q \cdot \underline{R}) + (P \cdot Q \cdot R)$$

13. Write the POS form of boolean function  $H$ , which is represented in a truth table as follows:

$A$	$B$	$C$	$H$
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

SOL

$A$	$B$	$C$	$H$	Maxterm
0	0	0	0	$A + B + C$
0	0	1	1	$A + B + \bar{C}$
0	1	0	1	$A + \bar{B} + C$
0	1	1	1	$A + B + C$
1	0	0	1	$\bar{A} + B + C$
1	0	1	0	$\bar{A} + B + \bar{C}$
1	1	0	0	$\bar{A} + \bar{B} + C$
1	1	1	1	$\bar{A} + \bar{B} + \bar{C}$

To get the POS from, we need to product maxterms for all those input combinations that produce output as 0. Thus,

$$H(A, B, C) = (A + B + C) \cdot (\bar{A} + B + \bar{C}) \cdot (\bar{A} + \bar{B} + C).$$

14. Write the POS form a boolean function  $G$ , which is represented in a truth table as follows:

$u$	$v$	$w$	$G$
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

SOL

$u$	$v$	$w$	$G$	Maxterm
0	0	0	1	$u + v + w$
0	0	1	1	$u + v + \bar{w}$
0	1	0	0	$u + \bar{v} + w$
0	1	1	0	$u + \bar{v} + \bar{w}$

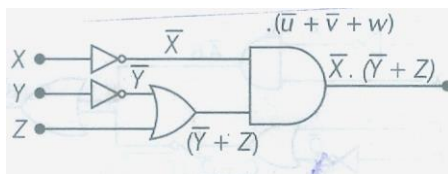
1	0	0	1	$\bar{u} + v + w$
1	0	1	1	$\bar{u} + \bar{v} + \bar{w}$
1	1	0	0	$\bar{u} + v + w$
1	1	1	1	$\bar{u} + \bar{v} + \bar{w}$

To get the POS form, we need to product maxterms for all those input combinations that produce output as 0. Thus,

$$G(u, v, w) = (u + \bar{v} + w) \cdot (u + \bar{v} + \bar{w}) \cdot (\bar{u} + \bar{v} + w) \cdot (\bar{u} + \bar{v} + \bar{w})$$

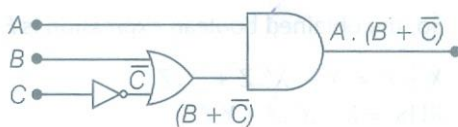
15. Draw a logic circuit diagram for the boolean expression:  $\bar{X} \cdot (\bar{Y} + Z)$

SOL



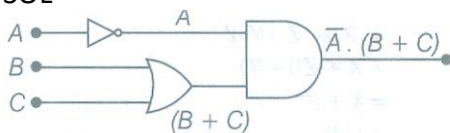
16. Draw a logic circuit diagram for the boolean expression:  $A \cdot (B + \bar{C})$

SOL



17. Draw a logic circuit diagram for the boolean expression:  $\bar{A} \cdot (B + C)$

SOL



18. Prove that  $X \cdot (X + Y) = X$  by truth table method.

SOL

X	Y	X + Y	X . (X + Y)
0	0	0	0
0	1	1	0
1	0	1	1
1	1	1	1

From the above table it is obvious that  $X \cdot (X + Y) = X$  because both the columns are identical.

19. Find the complement of the following Boolean function:

$$F_1 = AB' C'D'$$

SOL

$$(AB' + CD') = (AB')' \cdot (C'D')'$$

(De Morgan's first theorem)

$$= (A' + B'') \cdot (C'' + D'')$$

(De Morgan's second theorem)

i.e.  $A \cdot B = A + B$

$$= (A' + B) . (C + D)$$

$$(X'' = X)$$

20. In the Boolean Algebra, verify using truth table that  $X + XY$  for each  $X, y$  in  $(0, 1)$ .

SOL

As the expression  $X + XY$  is a two variable expression, so we require possible combinations Of values of  $X, Y$ . Truth Table will be as follows:

X	Y	$X + Y$	$X . (X + Y)$
0	0	0	0
0	1	0	0
1	0	0	1
1	1	1	1

Comparing the columns  $X + XY$  and  $X$ , we find, contents of both the columns are identical, hence verified.

21. In the Boolean Algebra, verify using truth table that  $(X + Y)' + X'Y'$  for each  $X' Y$  in  $(0, 1)$ .

Sol

As it is a 2 variable expression, truth table will be as follows:

X	Y	$X + Y$	$(X + Y)'$	$X'$	$Y'$	$X'Y'$
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

Comparing the columns  $(X + Y)'$  and  $X'Y'$ , both of the columns are identical, hence verified.

22. Give the dual of the following result in Boolean Algebra

$$X . X' = 0 \text{ for each } X.$$

Sol

Using duality principle, dual of  $X . X' = 0$  is  $X + X' = 1$  (By changing  $(.)$  to  $(+)$  and viceversa and by replacing 1's by 0's and vice versa).

23. Define the followings:

- (a) Minterm      (b) Maxterm      (c) Canonical form

Sol

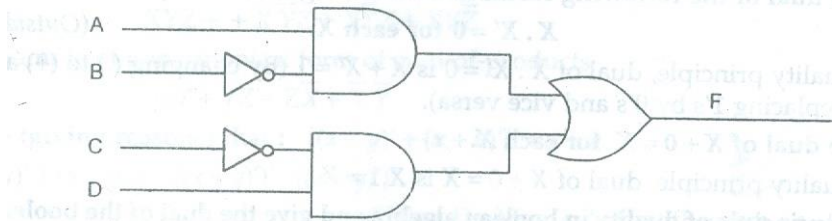
(a) A Minterm is a product of all the literals (with or without the bar) within the logic system.

(b) A Maxterm is a sum of all the literals (with or without the bar) within the logic system.



(c) A boolean expression composed entirely either of minterms or Maxterms is referred to canonical expression.

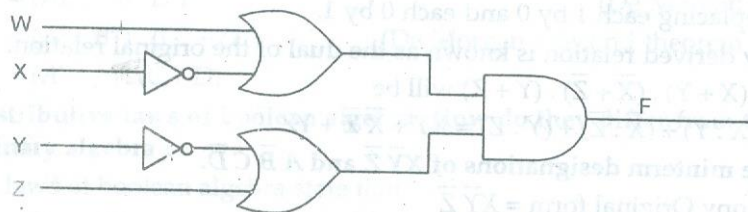
24. Interpret the following logic Circuit as Boolean expression:



Sol

$$F = AB + CD$$

25. Interpret the following Logic Circuit as Boolean Expression:



Sol

$$F = (W + X)(Y + Z).$$

26. Write the dual of the Boolean expression  $A + B' . C$ .

Sol

Dual of the Boolean expression  $A + B' . C$  is  $A . (B' + C)$ .

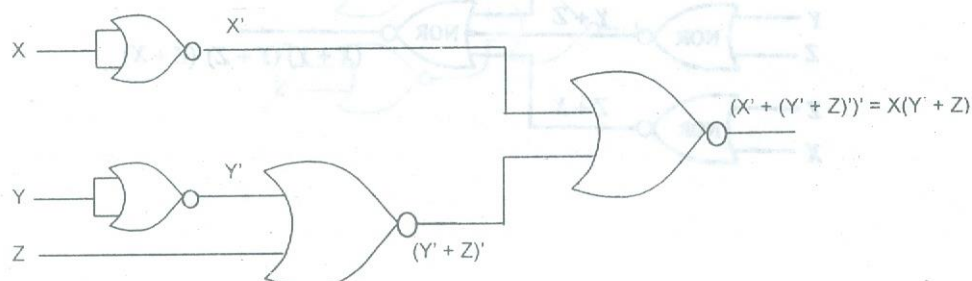
27. Write the dual of the Boolean expression  $(B' + C) . A$ .

Sol

Dual of the Boolean expression  $(B' + C) . A$  is  $(B' . C) + A$ .

28. Represent the boolean expression  $X(Y' + Z)$  with help of NOR gates only.

Sol



29. State Demorgan's Laws:

Sol

De Morgan's first theorem. It states that

$$X + Y = X . Y$$

De Morgan's second theorem. It states that  $X \cdot Y = \overline{\overline{X} + \overline{Y}}$

30. Which gates are called Universal gates and why?

Sol

NAND and NOR gates are less expensive and easier to design. Also, other switching functions and (AND, OR) can easily be implemented using NAND/NOR gates. Thus, these (NAND/NOR) gates are also referred to as *Universal Gates*.

## 2 Marks Questions

1. Name the law shown below and verify it using a truth table.

$$A + B \cdot C = (A + B) \cdot (A + C)$$

Sol

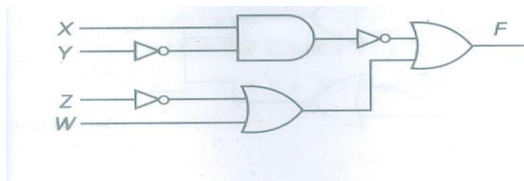
$$A + B \cdot C = (A + B) \cdot (A + C)$$

The above stated law is called distributive law.

A	B	C	B.C	A+B.C	A+B	A+C	(A+B).(A+C)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

Since, the column 5 and column 8 are equal. Hence, the given law  $A+B.C = (A + B).(A + C)$  is verified.

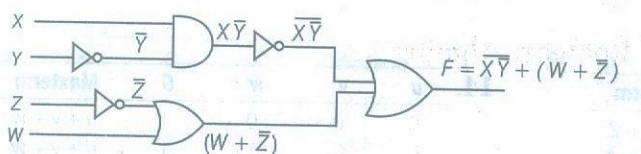
2. Obtain the Boolean expression for the logic circuit shown below:



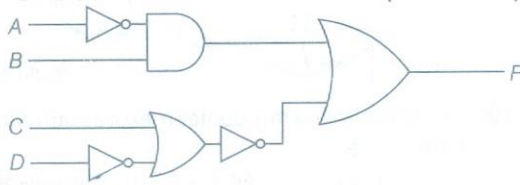
Name the law shown below and verify it using a truth table.

$$X + X' \cdot Y = X + Y$$

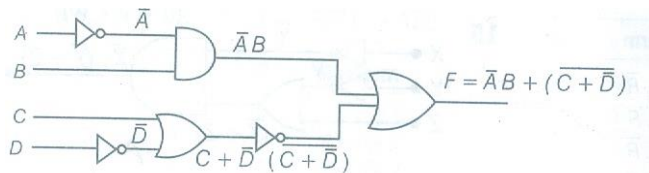
Sol



3 Obtain the Boolean expression for the logic circuit shown below:



Sol



So, the obtained boolean expression is  $F = \bar{A}B + (C + \bar{D})$

4 Verify the following using boolean laws

$$X + Z = X + X'.Z + Y.Z$$

Sol

$$X + Z = X + X'.Z + Y.Z$$

$$\text{RHS} = X + X'.Z + Y.Z$$

$$= (X + X').(X + Z) + Y.Z$$

(by using distributive law)

$$= 1.(X + Z) + Y.Z$$

(by using  $X + X' = 1$ )

$$= X + Z + Y.Z$$

$$= X + Z(1+Y)$$

$$= X + Z$$

(by using absorption law)

$$= \text{LHS}$$

**Hence proved**

5 Verify the following using boolean laws

$$A + C = A + A'.C + B.C$$

Sol

$$A + C = A + A'.C + B.C$$

$$\text{RHS} = A + A'.C + B.C$$

$$= (A + A').(A + C) + B.C$$

(by using distributive law)

$$= 1.(A + C) + B.C$$

(by using  $A + A' = 1$ )

$$= A + C + B.C$$

$$= A + C.(1+B)$$

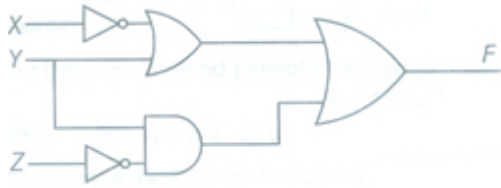
$$= A + C$$

(by using absorption law)

$$= \text{LHS}$$

**Hence proved**

6 Obtain the Boolean expression for the logic circuit shown below:



Sol

So, the obtained boolean expression is  $F = (X' + Y) + Y \cdot Z'$

7 State DeMorgan's laws. Verify one of the DeMorgan's laws using a truth table.

Sol

DeMorgan's Laws:

It states that

(i)  $\overline{(A + B)} = \overline{A} \cdot \overline{B}$       (ii)  $\overline{(A \cdot B)} = \overline{A} + \overline{B}$

Truth table for  $\overline{(A + B)} = \overline{A} \cdot \overline{B}$

A	B	A+B	$\overline{(A+B)}$	$\overline{A}$	$\overline{B}$	$\overline{A} \cdot \overline{B}$
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

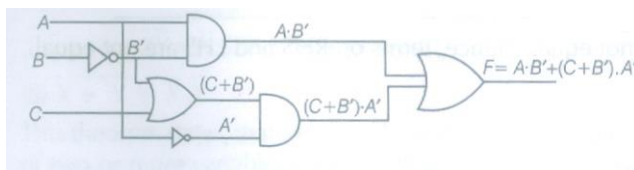
Column 4 and Column 7 are equal, first law is proved.

8 Draw a logic circuit for the following boolean expression.

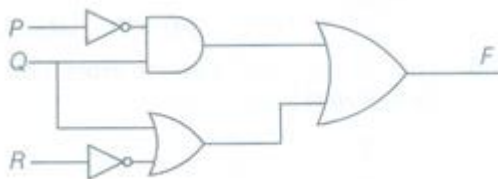
$$A \cdot B' + (C + B') \cdot A'$$

Sol

$$F = A \cdot B' + (C + B') \cdot A'$$



9 Obtain the Boolean expression for the logic circuit shown below:



Sol

So, the obtained boolean expression is  $F = P'Q + (Q + R')$

10 Verify the following using boolean expression using truth table:

- (i)  $X + 0 = X$
- (ii)  $X + X' = 1$

Sol

(i)  $X + 0 = X$

X	0	X + 0
0	0	0
1	0	1

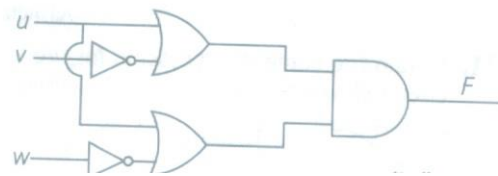
So,  $X + 0 = X$

(ii)  $X + X' = 1$

X	X'	X + X'
0	1	1
1	0	1

As  $X + X' = 1$ . Hence proved.

11 Write the equivalent Boolean expression for the following logic circuit:



Sol

So, the obtained boolean expression if  $F = (u + \bar{v}) \cdot (u + \bar{w})$

12 Verify the following boolean expression using truth table:

- (i)  $X \cdot X' = 0$
- (ii)  $X + 1 = 1$

Sol

(i)  $X \cdot X' = 0$

X	X'	X.X'
0	1	0
1	0	0

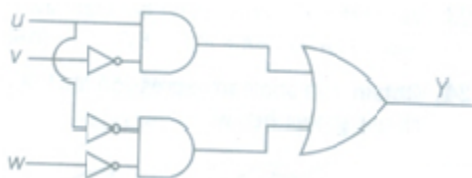
As  $X \cdot X' = 0$ . Hence proved.

(ii)  $X + 1 = 1$

X	1	X + 1
0	1	1
1	1	1

As  $X + 1 = 1$ . Hence proved.

13 Write the equivalent boolean expression for the following logic circuit:



Sol

So, the obtained boolean expression is  $Y = (u \cdot v') + (u' \cdot w')$

14 Verify the following boolean expression using truth table:

$$u \cdot (u' + v) = (u + v)$$

sol

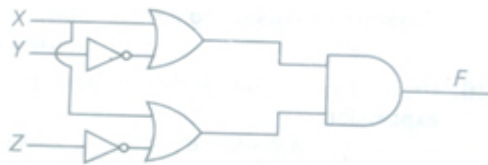
$u \cdot (u' + v) = u + v$

u	v	u'	u'+v	u+v	u.(u'+v)
0	0	1	1	0	0
0	1	1	1	1	0
1	0	0	0	1	0
1	1	0	1	1	1

As  $u \cdot (u' + v)$  and  $u + v$  columns are not equal. Hence, terms on RHS and LHS are not equal.

Hence,  $u \cdot (u' + v) \neq u + v$

15. Write the equivalent boolean expression for the following logic circuit:



Sol

So, the obtained boolean expression is  $F = (X + Y') \cdot (X + Z')$

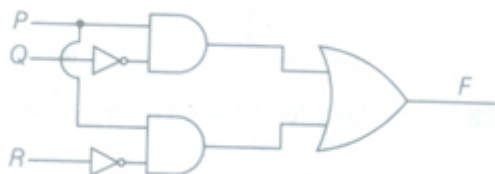
16. Verify the following boolean expression using truth table:

$$X + Y \cdot Z = (X + Y) \cdot (X + Z)$$

Sol

X	Y	Z	YZ	X + YZ	X + Y	X + Z	(X + Y) \cdot (X + Z)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

17. Write the equivalent boolean expression for the following logic circuit:



Sol

$$(P \cdot Q') + (P \cdot R')$$

18. State and prove DeMorgan's laws in boolean algebra.

Sol

DeMorgan's Laws

The two DeMorgan's theorems are:

(i)  $\overline{XY} = \overline{X} + \overline{Y}$

This theorem states, that the complement of a product is equal to sum of complements, i.e.

complement of two or more variables used in AND gate is the same as the OR gate of the complement of each individual variables.

Truth Table						
X	Y	$\overline{X}$	$\overline{Y}$	XY	$\overline{XY}$	$\overline{X} + \overline{Y}$
0	0	1	1	0	1	1
0	1	1	0	0	1	1
1	0	0	1	0	1	1
1	1	0	0	1	0	0

$\overline{XY} = \overline{X} + \overline{Y}$ . Hence approved

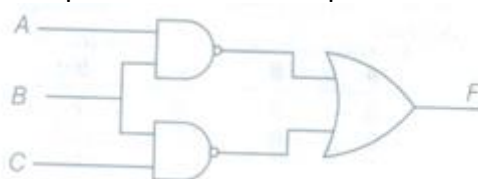
(ii)  $\overline{X + Y} = \overline{X} \cdot \overline{Y}$

This theorem states, that the complement of sum of equal to product of complements, i.e. complement of two or more variables used in OR gate is the same as the AND gate of the complements of each individual variables.

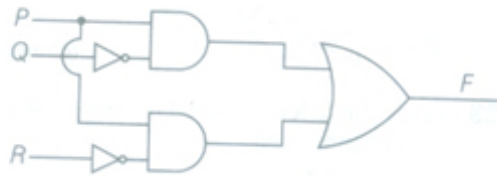
Truth Table						
X	Y	X + Y	$\overline{X}$	$\overline{Y}$	$\overline{X + Y}$	$\overline{X} \cdot \overline{Y}$
0	0	0	1	1	1	1
0	1	1	1	0	0	0
1	0	1	0	1	0	0
1	1	1	0	0	0	0

$\overline{X + Y} = \overline{X} \cdot \overline{Y}$ . Hence proved.

19. Write the equivalent boolean expression for the following logic circuit:



20. Write the equivalent boolean expression for the following logic circuit:



21. Verify the following algebraically:

$$X'.Y + X.Y' = (X' + Y') . (X + Y)$$

Sol  $X'.Y + X.Y' = (X' + Y') . (X + Y)$

Taking RHS

$$\begin{aligned} (X' + Y') . (X + Y) \\ &= X'X + X'Y + Y'X + Y'Y \\ &= 0 + X'Y + Y'X + 0 \end{aligned}$$

$$[X.X' = 0]$$

$$= X'Y + X.Y'$$

$$[X.Y' = Y'.X]$$

$$= \text{RHS}$$

**Hence proved**

22. Verify the following algebraically:

$$(A' + B') . (A + B) = A'.B + A . B'$$

Sol

$$(A' + B') . (A + B) = A'B + AB'$$

$$\begin{aligned} \text{LHS } (A' + B') . (A + B) \\ &= A'.A + A'B + B'A + B'B \\ &= 0 + A'B + B'A + 0 \\ &= A'B + AB' \\ &= \text{RHS} \end{aligned}$$

$$[\text{as } A'.A = 0]$$

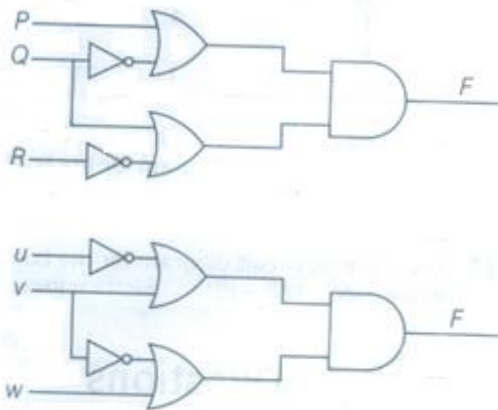
$$[\text{as } A.B' = B'.A]$$

**Hence proved**

23. Write the equivalent boolean expression for the following logic circuit:



24. Write the equivalent boolean expression for the following logic circuit:



25. Verify  $X' \cdot Y + X \cdot Y' + X' \cdot Y' = (X' + Y')$  using truth table.

Sol

X	Y	X'	Y'	X'Y	XY'	X'Y'	X'Y + XY' + X'Y'	X' + Y'
0	0	1	1	0	0	1	1	1
0	1	1	0	1	0	0	1	1
1	0	0	1	0	1	0	1	1
1	1	1	0	0	0	0	0	0

As columns

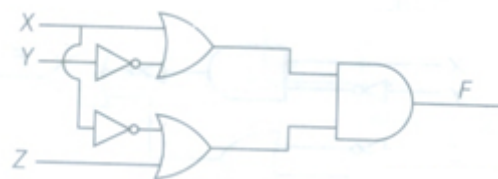
$X'Y + XY' + X'Y' + X' + Y'$  and  $X' + Y'$  are equal.

So,

$X'Y + XY' + X'Y' = X' + Y'$

**Hence proved**

26. Write the equivalent boolean expression for the following logic circuit:



27. Represent  $(P + Q' \cdot R)$  in POS form.

Sol

P	Q	R	Q'	Q'R	P + Q'R	Maxterm
0	0	0	1	0	0	$P + Q + R$
0	0	1	1	1	1	$P + Q + R'$
0	1	0	0	0	0	$P + Q' + R$
0	1	1	0	0	0	$P + Q' + R'$
1	0	0	1	0	1	$P' + Q + R$
1	0	1	1	1	1	$P + Q + R'$

1	1	0	0	0	1	$P + Q' + R$
1	1	1	0	0	1	$P + Q' + R'$

The POS form of  $P + Q'R$  will be  $(P + Q + R). (P + Q' + R). (P + Q' + R')$

28. State the verify absorption law in boolean algebra.

Sol

Absorption law states

(i)  $X + XY = X$

(ii)  $X(X + Y) = X$

Truth table for  $X + XY = X$

X	Y	XY	X + XY
0	0	0	0
0	1	0	0
1	0	0	1
1	1	1	1

Hence, columns 1 and 4 are equal.

As  $X + XY = X$

Truth table for  $X(X + Y) = X$

X	Y	X + Y	X(X + Y)
0	0	0	0
0	1	1	0
1	0	1	1
1	1	1	1

Hence, columns 1 and 4 are equal.

As  $X(X + Y) = X$

29. Convert the following boolean expression into its equivalent canonical Sum of Product (SOP) form:

$$(X' + Y + Z').(X' + Y + Z).(X' + Y' + Z).(X' + Y' + Z')$$

Sol

$$F = (X' + Y + Z').(X' + Y + Z).(X' + Y' + Z).(X' + Y' + Z')$$

$$= (101). (100). (110). (111)$$

$$= M_5. M_4. M_6. M_7$$

$$= \prod (4, 5, 6, 7)$$

Thus, equivalent SOP expression will be (incorporating the missing terms from POS expression)

$$= \sum (0, 1, 2, 3)$$

i.e.  $m_0 + m_1 + m_2 + m_3 = (X. Y. Z) + (X. Y. \bar{Z}) + (X. \bar{Y}. Z) + (X. \bar{Y}. \bar{Z})$

30. Convert the following boolean expression into the equivalent canonical product of Sum (POS) form.

$$A.B'.C + A'.B.C + A'.B.C'$$

Sol

$$A.B'.C + A'.B.C + A'.B.C'$$

$$\text{i.e. } (101) \quad (011) \quad (010)$$

$$= m_5 + m_3 + m_2 = \sum (2, 3, 5)$$

⇒ POS is equal to

$$= \prod (0, 1, 4, 6, 7)$$

$$= M_0.M_1.M_4.M_6.M_7$$

$$= (A + B + C). (A + B + \bar{C}). (\bar{A} + B + C). (\bar{A} + \bar{B} + C). (\bar{A} + \bar{B} + \bar{C}).$$

31. State and verify distributive law in boolean algebra.

Sol

Distributive law states

$$(i) X(Y + Z) = XY + XZ \quad \text{and} \quad (ii) X + YZ = (X + Y)(X + Z)$$

Truth table for  $X(Y + Z) = XY + XZ$

X	Y	Z	Y + Z	X.(Y + Z)	XY	XZ	XY + XZ
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

As columns  $X.(Y + Z)$  and  $XY + XZ$  are equal.

$$\text{As } X.(Y + Z) = XY + XZ$$

Hence

**proved**

Truth table for  $X + YZ = (X + Y)(X + Z)$

z)

X	Y	Z	YZ	X + YZ	X + Y	X + Z	(X + Y)(X + Z)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0

0	1	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1	1
1	0	1	0	1	1	1	1	1
1	1	0	0	1	1	1	1	1
1	1	1	1	1	1	1	1	1

As columns  $(X + YZ)$  and  $(X + Y) + (X + Z)$  are equal.

As  $X + YZ = (X + Y)(X + Z)$

**Hence proved**

32. Convert the following boolean expression into its equivalent canonical Sum of Product (SOP):

$$(u' + v + w').(u + v' + w').(u + v + w)$$

33. Given the following truth table, write the sum of products from of the function  $F(x, y, z)$ :

x	y	z	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Sol

$$X' y' z + x' y' z' + x y' z' + xyz$$

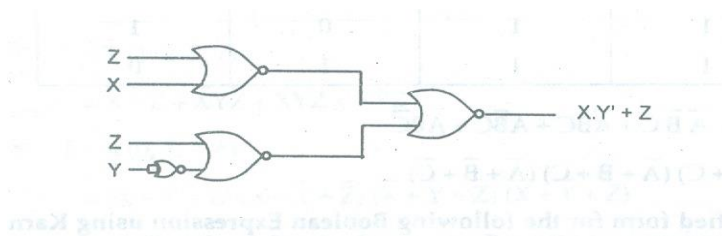
34. Prove the algebraically  $x' y' z' + x' y' z + x' y z' + x' y z + x y' z' + x y' z = x' + y'$ .

Sol

$$x' y' z' + x' y' z + x' y z' + x' y z + x y' z' + x y' z = x' + y'$$

$$\text{L.H.S.} = x' y' (z' + z) + x' y (z + z') + x y' (z' + z)$$

$$= x' y' + x' y + x y'$$



$$(z' + z = 1, z + z' = 1)$$

$$= x' (y' + y) + x y'$$

$$= x' + x y'$$

35. Convert  $X + Y$  to minterms

Sol

$$X + Y = X \cdot 1 + Y \cdot 1$$

$$\begin{aligned}
&= X \cdot (Y + \bar{Y}) + Y(X + \bar{X}) && (X + \bar{X} = 1 \text{ complementarity law}) \\
&= XY + X\bar{Y} + XY + X\bar{Y} \\
&= XY + X\bar{Y} + XY + X\bar{Y} \\
&= XY + X\bar{Y} + XY && (XY + X\bar{Y} + XY \text{ Idempotent law})
\end{aligned}$$

36. Convert the following three input F denoted by the expression  $F = \sum (0, 1, 2, 5)$  into its canonical Sum-of-Products form.

Sol

If three inputs we take as X, Y and Z then

$$F = m_0 + m_1 + m_2 + m_5$$

$$m_0 = 000 \longrightarrow \bar{X}\bar{Y}\bar{Z}$$

$$m_1 = 001 \longrightarrow \bar{X}\bar{Y}Z$$

$$m_2 = 010 \longrightarrow \bar{X}Y\bar{Z}$$

$$m_5 = 101 \longrightarrow X\bar{Y}Z$$

Canonical S-O-P form of the expression is

$$\bar{X}\bar{Y}\bar{Z} + \bar{X}\bar{Y}Z + \bar{X}Y\bar{Z} + X\bar{Y}Z$$

37. Simplify  $\bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}BCD + A\bar{B}C\bar{D} + ABCD$ .

Sol

$$\begin{aligned}
&= \bar{A}\bar{B}C(D' + D) + ABC(D' + D) \\
&= \bar{A}\bar{B}C \cdot 1 + ABC \cdot 1 && (D + D' = 1) \\
&= AC(\bar{B} + B) \\
&= AC \cdot 1 = AC && (B + B' = 1)
\end{aligned}$$

38. Provide that  $X \cdot (X + Y) = X$  by algebraic method.

Sol

$$L.H.S = X \cdot (X + Y)$$

$$\begin{aligned}
&= X \cdot X + X \cdot Y \\
&= X + X \cdot Y && (X \cdot X = X) \\
&= X \cdot (1 + Y) \\
&= X \cdot 1 = X = R.H.S && (1 + Y = 1) \\
&= X \cdot 1 = X = R.H.S
\end{aligned}$$

39. Verify  $X \cdot Y' + Y' \cdot Z = X \cdot Y' \cdot Z' + X \cdot Y' \cdot Z' + X' \cdot Y' \cdot Z$  algebraically.

Sol

$$LHS = X \cdot Y' + Y' \cdot Z$$

$$\begin{aligned}
&= X \cdot Y' (Z + Z') + (X + X') Y' \cdot Z && (Z + Z' = 1 \text{ and } X + X' = 1) \\
&= XY'Z + XY'Z' + XY'Z + X'Y'Z \\
&= XY'Z + XY'Z + X'Y'Z \\
&= RHS, \text{ Hence Proved.}
\end{aligned}$$

40. Perform the following:  
 (a) State and prove the De Morgan's Theorem (Any One) Algebraically.

Sol

(a) DeMorgan's Theorem's state that

$$(i) \overline{X + Y} = \overline{X} \cdot \overline{Y} \qquad (ii) \overline{X \cdot Y} = \overline{X} + \overline{Y}$$

Proof. Assuming that DeMorgan's laws are true. That means, all Boolean laws should hold on it. Let

$$X + Y = P$$

As from given theorem (i), we get

$$Q = \overline{X} \cdot \overline{Y}$$

Since Boolean laws hold on it, complementarity law should also hold on it.

$$\implies P + \overline{P} = 1 \text{ and } P \cdot \overline{P} = 0$$

$$P + P = 1$$

Replacing value of P, we get

$$\overline{P} + \overline{X} \cdot \overline{Y} + 1$$

$$\text{LHS} = (P + X) (P + Y)$$

Replacing value of P, we get

$$(X + Y + X) (X + Y + Y) = (X + X + Y) (X + 1)$$

$$= (1 + Y) (X + 1)$$

$$(X + X' = Y + Y' = 1)$$

$$= 1 \cdot 1$$

$$(1 + Y = 1 + X = 1)$$

$$= 1 = \text{RHS}$$

Similarly, replacing P and P in  $P \cdot \overline{P} = 0$ , we get

$$(X + Y) \overline{X} \cdot \overline{Y} = 0$$

$$\text{LHS} = \overline{XX} + \overline{YY}$$

$$= 0 + 0$$

$$(XX' = 0, YY' = 0)$$

$$= 0 = \text{RHS.}$$

Thus, complementarity law fully holds on it.

$\implies$  DeMorgan theorem is a legal Boolean algebra theorem.

41. State and prove the absorption algebraically.

Sol

Absorption law states that

$$(i) X + XY = X \qquad \text{and} \qquad (ii) X (X + Y) = X$$

Proof. (i)  $X + XY = X$

$$\text{LHS} + XY = X (1 + Y)$$

$$= X \cdot 1$$

$$[1 + Y = 1]$$

$$= X = \text{RHS Hence Proved.}$$

42. Given the following truth table, derive a Sum of Product (SOP) and Product of Sum (POS) form

of Boolean expression from it:

X	Y	Z	G (X, Y, Z)
0	0	0	0
0	0	1	1
0	1	0	1
0	1	0	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

43. Given the following truth table, derive a sum of product (SOP) and Product of Sum (POS) form of Boolean expression from it.

A	B	C	F (A, B, C)
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

44. Represent the Boolean expression  $X \cdot Y' + Z$  with the help of NOR gates only.

Sol

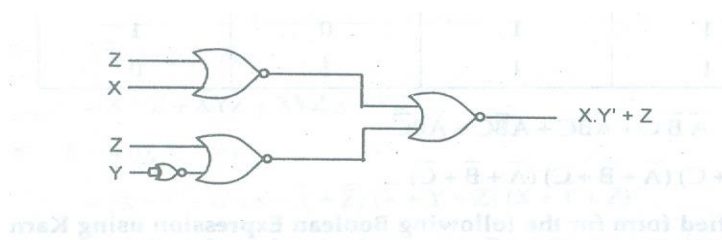
$$X \cdot Y' + Z$$

$$= Z + XY'$$

$$= (Z + X) (Z + Y')$$

$$[X + Y = Y + X]$$

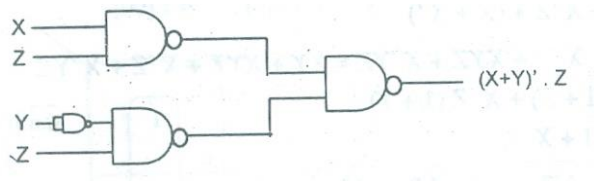
$$[X + YZ = (X + Y) (X + Z)]$$



45. Represent the Boolean expression  $(X + Y') \cdot Z$  with the help of NAND gates only.

Sol

$$(X + Y') \cdot Z = X \cdot Z + Y' \cdot Z$$

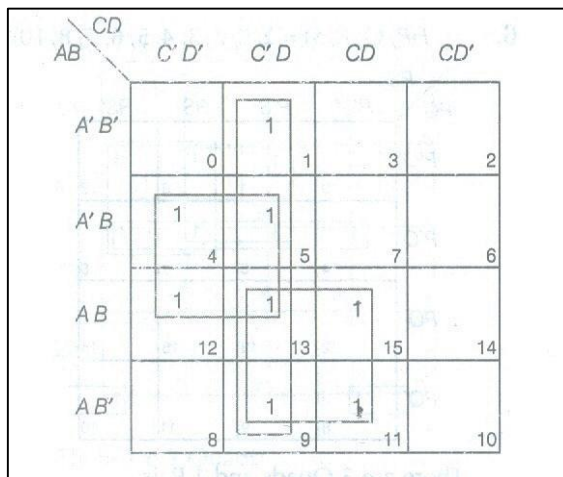


### 3 Marks Questions

- Obtain the minimal form for the following boolean expression using Karnaugh's Map:

$$F(A, B, C, D) = \sum(1, 4, 5, 9, 11, 12, 13, 15)$$

*Sol*



There are 3 Quads:

Quad 1 ( $m_1 + m_5 + m_9 + m_{13}$ ) reduces to  $C'D$

Quad 2 ( $m_4 + m_5 + m_{12} + m_{13}$ ) reduces to  $BC'$

Quad 3 ( $m_9 + m_{11} + m_{13} + m_{15}$ ) reduces to  $AD$

Hence, the final expression is:

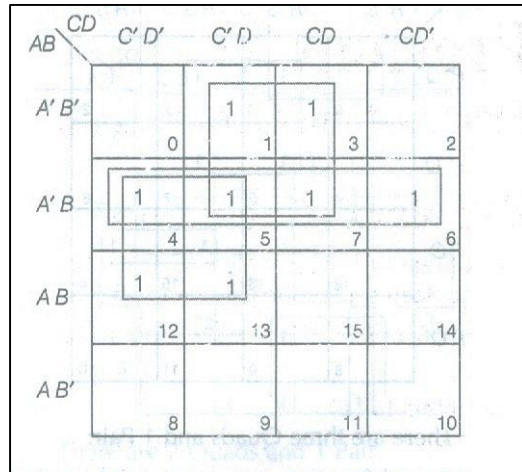
$$F(A, B, C) = C'D + BC' + AD$$

- Obtain the minimal form for the following boolean expression using Karnaugh's Map:

$$F(A, B, C, D) = \sum(1, 3, 4, 5, 6, 7, 12, 13)$$

*Sol*





There are 3 Quads:

Quad 1 ( $m_1 + m_3 + m_5 + m_7$ ) reduces to  $A'D$

Quad 2 ( $m_4 + m_5 + m_6 + m_7$ ) reduces to  $A'B$

Quad 3 ( $m_4 + m_5 + m_{12} + m_{13}$ ) reduces to  $BC'$

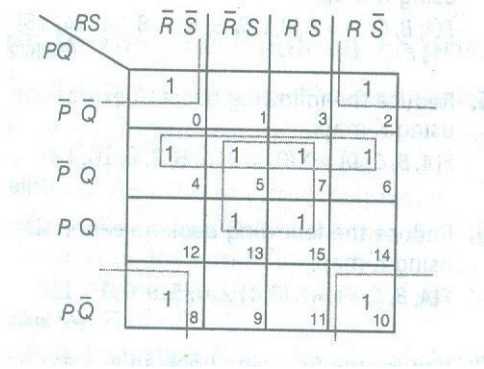
Hence, the final expression is:

$$F(A, B, C, D) = A'D + A'B + BC'$$

3. Obtain a simplified form for the following boolean expression using Karnaugh's Map:

$$F(P, Q, R, S) = \sum(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$$

Sol



There are three Quads:

Quad 1 ( $m_4 + m_5 + m_6 + m_7$ ) reduces to  $\bar{P}Q$

Quad 2 ( $m_5 + m_7 + m_{13} + m_{15}$ ) reduces to  $QS$

Quad 3 ( $m_0 + m_2 + m_8 + m_{10}$ ) reduces to  $Q\bar{S}$

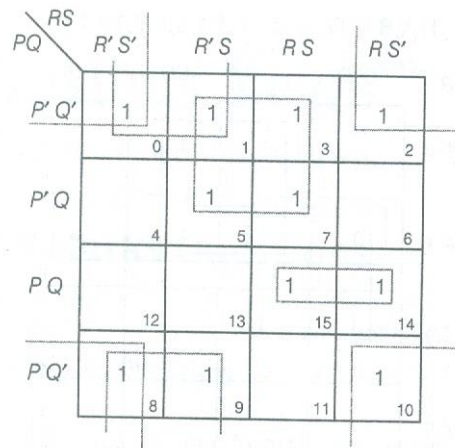
Hence, the final expression is:

$$F(P, Q, R, S) = \bar{P}Q + QS + Q\bar{S}$$

4. Obtain the minimal form for the following boolean expression using Karnaugh's Map:

$$H(P, Q, R, S) = \sum(0, 1, 2, 3, 5, 7, 8, 9, 10, 14, 15)$$

Sol



There are three Quads and 1 Pair:

Quad 1 ( $m_0 + m_2 + m_8 + m_{10}$ ) reduces to  $\overline{Q}S$

Quad 2 ( $m_1 + m_3 + m_5 + m_7$ ) reduces to  $\overline{P}S$

Quad 3 ( $m_0 + m_1 + m_8 + m_9$ ) reduces to  $\overline{Q}R$

Pair 1 ( $m_{14} + m_{15}$ ) reduces to  $PQR$

Hence, the final expression is:

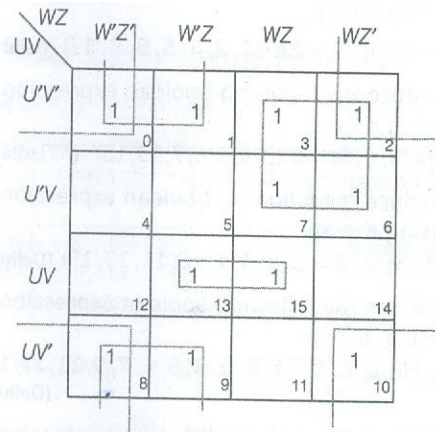
$$H(P, Q, R, S) = \overline{Q}S + \overline{P}S + \overline{Q}R + PQR$$

5. Obtain the minimal form for the following boolean expression using Karnaugh's Map:

$$F(U, V, W, Z) = \sum(0, 1, 2, 3, 6, 7, 8, 9, 10, 13, 15)$$

Sol

0.  $F(U, V, W, Z) = \sum(0, 1, 2, 3, 6, 7, 8, 9, 10, 13, 15)$



There are three Quads and 1 Pair:

Quad 1 ( $m_0 + m_2 + m_8 + m_{10}$ ) reduces to  $\overline{V} Z$

Quad 2 ( $m_0 + m_1 + m_8 + m_9$ ) reduces to  $\overline{V} \overline{W}$

Quad 3 ( $m_2 + m_3 + m_6 + m_7$ ) reduces to  $U W$

Pair 1 ( $m_{13} + m_{15}$ ) reduces to  $UVZ$

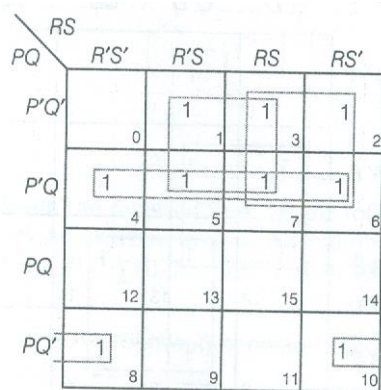
Hence, the final expression is:

$$F(U, V, W, Z) = V' Z' + V' W' + U' W + UVZ$$

6. Reduce the following boolean expression using K-map:

$$F(P, Q, R, S) = \Sigma(1, 2, 3, 4, 5, 6, 7, 8, 10)$$

Sol



There are three Quads and 1 Pair:

Quad 1 ( $m_1 + m_3 + m_5 + m_7$ ) reduces to  $P'S$

Quad 2 ( $m_4 + m_5 + m_6 + m_7$ ) reduces to  $P'Q$

Quad 3 ( $m_2 + m_3 + m_6 + m_7$ ) reduces to  $P'R$

Pair 1 ( $m_8 + m_{10}$ ) reduces to  $PQ'S'$

Hence, the final expression is:

$$F(P, Q, R, S) = P'S + P'Q + P'R + PQ'S'$$

7. Reduce the following boolean expression using K-map:

$$F(A, B, C, D) = \sum(2, 3, 4, 5, 6, 7, 8, 10, 11)$$

Sol

AB \ CD		CD			
		$\bar{C}\bar{D}$	$\bar{C}D$	$CD$	$C\bar{D}$
$\bar{A}\bar{B}$	$\bar{C}\bar{D}$			1	1
	$\bar{C}D$				
$\bar{A}B$	$\bar{C}\bar{D}$	1	1	1	1
	$\bar{C}D$				
$AB$	$\bar{C}\bar{D}$				
	$\bar{C}D$				
$A\bar{B}$	$\bar{C}\bar{D}$	1		1	1
	$\bar{C}D$				

There are 2 Quads and 1 Pair:

Quad 1 ( $m_4 + m_5 + m_6 + m_7$ ) reduces to  $\bar{A}B$

Quad 2 ( $m_2 + m_3 + m_{10} + m_{11}$ ) reduces to  $\bar{B}C$

Pair 1 ( $m_8 + m_{10}$ ) reduces to  $ABD$

Hence, the final expression is:

$$F(A, B, C, D) = \bar{A}B + \bar{B}C + ABD$$

8. Reduce the following boolean expression using K-map:

$$F(A, B, C, D) = \sum(0, 1, 2, 4, 5, 6, 8, 10,)$$

Sol

AB \ CD		CD			
		$C'D'$	$C'D$	$CD$	$CD'$
$A'B'$	$C'D'$	1	1		1
	$C'D$				
$A'B$	$C'D'$	1	1		1
	$C'D$				
$AB$	$C'D'$				
	$C'D$				
$AB'$	$C'D'$	1			1
	$C'D$				

There are 3 Quads:

Quad 1 ( $m_0 + m_1 + m_4 + m_5$ ) reduces to  $A'C'$

Quad 2 ( $m_0 + m_2 + m_8 + m_{10}$ ) reduces to  $B'D'$

Quad 3 ( $m_0 + m_2 + m_4 + m_6$ ) reduces to  $A'D'$

Hence, the final expression is:

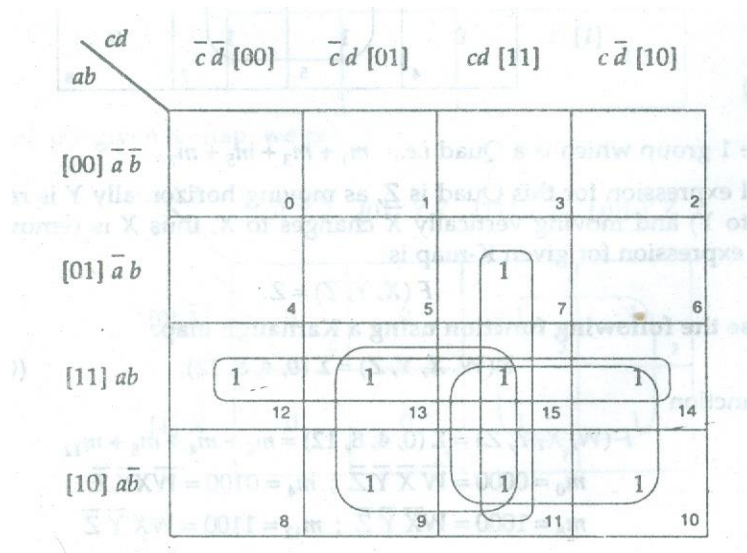
$$F(A, B, C, D) = A'C' + B'D' + A'D'$$

9. Reduce the following boolean expression using K-map:  
 $F(P, Q, R, S) = \sum(0, 1, 2, 4, 5, 6, 8, 12)$
10. Reduce the following boolean expression using K-map:  
 $F(A, B, C, D) = \sum(3, 4, 5, 6, 7, 13, 15)$
11. Reduce the following boolean expression using K-map:  
 $F(u, v, w, z) = \sum(3, 5, 7, 10, 11, 13, 15)$
12. Reduce the following boolean expression using K-map:  
 $F(P, Q, R, S) = \sum(1, 2, 3, 5, 6, 7, 9, 11, 12, 13, 15)$
13. Reduce the following boolean expression using K-map:  
 $H(u, v, w, z) = \sum(0, 1, 4, 5, 6, 7, 11, 12, 13, 14, 15)$
14. Reduce the following boolean expression using K-map:  
 $F(A, B, C, D) = \sum(0, 1, 2, 3, 6, 7, 8, 11, 14, 15)$
15. Reduce the following boolean expression using K-map:  
 $F(A, B, C, D) = \sum(0, 2, 3, 4, 6, 7, 8, 10, 12,)$
16. Reduce the following boolean expression using K-map:  
 $F(A, B, C, D) = \sum(0, 1, 2, 4, 5, 8, 9, 10, 11,)$
17. Reduce the following boolean expression using K-map:  
 $F(A, B, C, D) = \sum(1, 3, 4, 5, 7, 9, 11, 12, 13, 14)$
18. If  $F(a, b, c, d) = \sum(0, 2, 4, 5, 7, 8, 10, 12, 13, 15)$ , obtain the simplified form using K-Map.
19. What is the simplified Boolean equation for the following K-map.

	$cd$	$\bar{c}\bar{d}$ [00]	$\bar{c}d$ [01]	$cd$ [11]	$c\bar{d}$ [10]
$ab$	01	[00] $\bar{a}\bar{b}$	[01] $\bar{a}b$	[11] $ab$	[10] $a\bar{b}$
	0	1	3	2	
	4	5	7	6	
	12	13	15	14	
	8	9	11	10	

Sol

Completing the Karnaugh map by entering 0's in the empty squares with their minterm's subscripts and then by encircling all possible groups, we get the following K-map.



3 Quads and a pair is marked:

Quad 1 ( $m_{12} + m_{13} + m_{14} + m_{15}$ ) reduces to  $ab$

Quad 2 ( $m_9 + m_{11} + m_{13} + m_{15}$ ) reduces to  $ad$

Quad 3 ( $m_{10} + m_{11} + m_{14} + m_{15}$ ) reduces to  $ac$

Pair 1 ( $m_2 + m_{10}$ ) reduces to  $bcd$ .

Hence the final reduced expression is

$$F = ab + ad + ac + bcd$$

20. Minimise the following function using a Karnaugh map.

$$F(W, X, Y, Z) = \sum (0, 4, 8, 12).$$

Sol

1. Given function

$$F(W, X, Y, Z) = \sum (0, 4, 8, 12) = m_0 + m_4 + m_8 + m_{12}$$

$$m_0 = 0000 = \underline{W} \underline{X} \underline{Y} \underline{Z}; m_4 = 0100 = \underline{W} \underline{X} \underline{Y} \underline{Z}$$

$$m_8 = 1000 = \underline{W} \underline{X} \underline{Y} \underline{Z}; m_{12} = 1100 = \underline{W} \underline{X} \underline{Y} \underline{Z}$$

Mapping the given function on a K-map, we get

		YZ			
	WX	[00] $\bar{Y}\bar{Z}$	[01] $\bar{Y}Z$	[11] $YZ$	[10] $Y\bar{Z}$
[00] $\bar{W}\bar{X}$	1	0	0	0	0
[01] $\bar{W}X$	1	0	0	0	0
[11] $WX$	1	0	0	0	0
[10] $W\bar{X}$	1	0	0	0	0
		0	1	3	2
		4	5	7	6
		12	13	15	14
		8	9	11	10

Only 1 group is here, a Quad ( $m_0 + m_4 + m_{12} + m_8$ )

Reduced expression for this quad is  $YZ$  thus, final reduced expression is  $F = YZ$ .

21. Obtain the simplified form a Boolean expression:

$$F(u, v, w, z) = \sum (0, 1, 3, 5, 7, 9, 10, 11, 12, 13, 14, 15)$$

using Karnaugh Map.

Sol

2. There are 4 gps: 1 octet, 2 Quads and 1 pair

Octet ( $m_1 + m_3 + m_5 + m_7 + m_9 + m_{11} + m_{13} + m_{15}$ ) reduces to  $z$ .

Quad 1 ( $m_{12} + m_{13} + m_{14} + m_{15}$ ) reduces to  $uv$ .

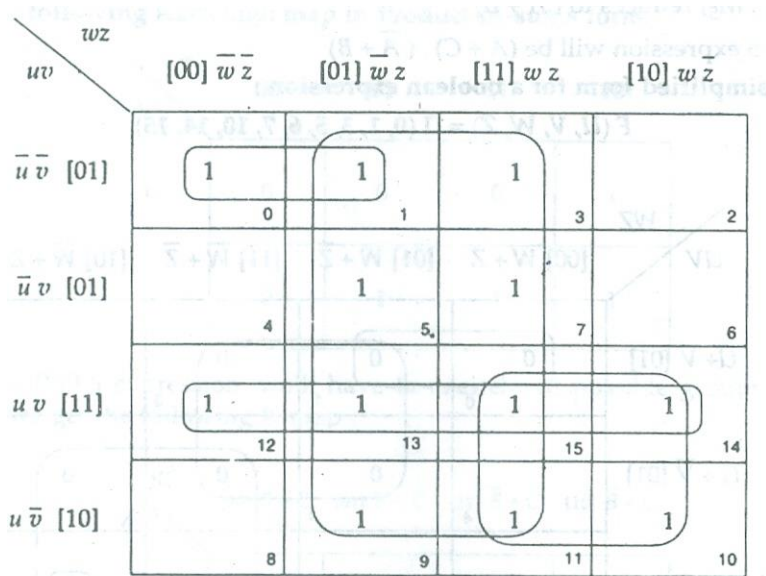
Quad 2 ( $m_{10} + m_{11} + m_{14} + m_{15}$ ) reduces to  $uw$ .

Pair ( $m_0 + m_1$ ) reduces to  $u v w$

The final reduced expression is

$$u v w + uv + uw + z$$

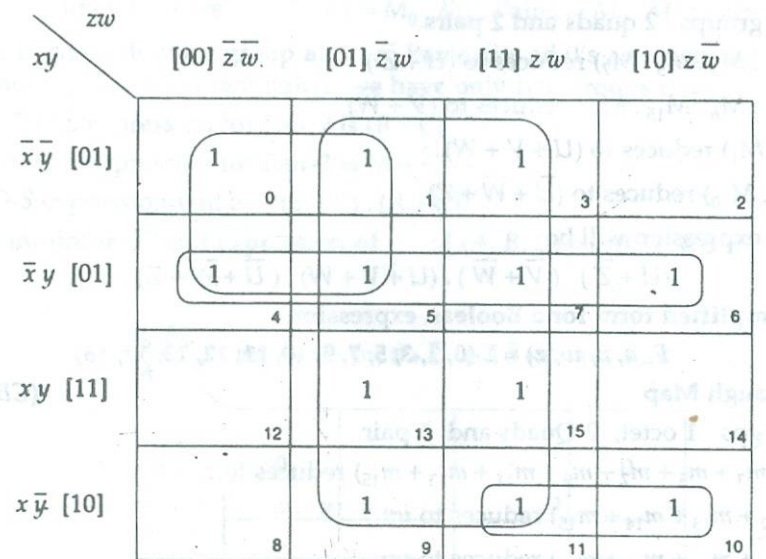




22. Obtain a simplified form for a Boolean expression  
 $F(x, y, z, w) = \sum(0, 1, 3, 4, 5, 6, 7, 9, 10, 11, 13, 15)$   
 using Karnaugh Map.

Sol

3.



There are 4 groups: 1 octet, 2 Quads and 1 pair.

The octet ( $m_1 + m_3 + m_5 + m_7 + m_9 + m_{11} + m_{13} + m_{15}$ ) reduces to  $w$ .

The quad 1 ( $m_0 + m_1 + m_4 + m_5$ ) reduces to  $\bar{x}z$

The quad 2 ( $m_4 + m_5 + m_6 + m_7$ ) reduces to  $x\bar{y}$ .

The pair ( $m_0 + m_{11}$ ) reduces to  $x\bar{y}z$

The final reduced expression is

$$F(x, y, z, w) = w + \bar{x}z + x\bar{y} + x\bar{y}z$$



