

KENDRIYA VIDYALAYA SANGATHAN
केन्द्रीय विद्यालय संगठन



CLASS: XII

COM.SCIENCE

HIGHER ORDER THINKING SKILLS

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KENDRIYA VIDYALAYA SANGATHAN
BANGALORE REGION

QUESTION BANK
HIGHER ORDER THINKING SKILLS
CLASS XII – COMPUTER SCIENCE

Chief Patron	Shri Ranglal Jamuda, I. A. S. Commissioner KVS, New Delhi
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	Dr. U N Singh Joint Commissioner(Academics) KVS, New Delhi
Advisor	Shri S Vijaya Kumar Assistant Commissioner KVS, Bangalore Region
Guidance	Dr S D Chakrabarti Education Officer KVS, Bangalore Region
Co-ordinator	Smt M Sarala Principal K. V. IISC
Subject Contributors	Shri Pawanjeet Singh PGT Comp Sci ,KV Hebbal
	Sh Ashok Sengupta PGT Comp Sci ,KV No.1 Jalahalli
	Shri Ajmer Singh PGT Comp Sci Donimalai
	Shri Saras M Srivastava PGT Comp Sci ,KV IISC

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Note: Do not copy and paste the code to execute. Some formatting has been done to improve readability

Questions contributed by:

1. Shri Pawanjeet Singh, KV Hebbal
2. Shri Saroj Kumar Dash, KV Bidar
3. Ms. S. Kiran, KV, Malleshwaram
4. Shri. Saras M. Srivastava, KV, IISc.

Coordinator of the HOTS Question (Computer Science) Committee:

Mrs. M. Sarala, Principal, KV, IISc, Bangalore – 12

High Order Thinking Skill Questions

Subject : Computer Science

Class: XII

1 Mark Questions

Programming in C++

1. Observe the program segment carefully and answer the question that follows:

```
class item
{
    int item_no;
    char item_name[20];
public:
    void enterDetail();
    void showDetail();
    int getItem_no(){ return item_no;}
};
void modify(item x, int y )
{
    fstream File;
    File.open( "item.dat", ios::binary | ios::in | ios::out) ;
    item i;
    int recordsRead = 0, found = 0;
    while(!found && File.read((char*) &i , sizeof (i)))
    {
        recordsRead++;
        if(i . getItem_no() == y )
        {
            _____//Missing statement
            File.write((char*) &x , sizeof (x));
            found = 1;
        }
    }
    if(! found)
        cout<<"Record for modification does not exist" ;
    File.close() ;
}
```

If the function modify() is supposed to modify a record in the file “ item.dat “, which item_no is y, with the values of item x passed as argument, write the appropriate statement for the missing statement using seekp() or seekg(), whichever is needed, in the above code that would write the modified record at its proper place.

2. Observe the program segment carefully and answer the question that follows:

```
class member
{
```

```

        int member_no;
        char member_name[20];
    public:
        void enterDetail( );
        void showDetail( );
        int getMember_no(){ return member_no;}
};
void update(member NEW )
{
    fstream File;
    File.open( "member.dat", ios::binary|ios::in|ios::out) ;
    member i;
    while(File .read((char*) & i , sizeof (i)))
    {
        if(NEW . getMember_no( ) == i . getMember_no( ))
        {
            _____//Missing statement
            File.write((char*) &NEW , sizeof (NEW));
        }
    }
    File.close() ;
}

```

If the function update() is supposed to modify the member_name field of a record in the file “ member.dat” with the values of member NEW passed as argument, write the appropriate statement for the missing statement using seekp() or seekg(), whichever is needed, in the above code that would write the modified record at its proper place.

3. Observe the program segment carefully and answer the question that follows:

```

class item
{
    int item_no;
    char item_name[20];
    public:
        void enterDetails( );
        void showDetail( );
        int getItem_no( ){ return item_no;}
};
void modify(item x )
{
    fstream File;
    File.open( "item.dat", _____ ) ; //parameter missing
    item i;
    while(File .read((char*) & i , sizeof (i)))
    {
        if(x . getItem_no( ) == i . getItem_no( ))
    }
}

```

```

        {
            File.seekp(File.tellg() - sizeof(i));
            File.write((char*) &x , sizeof (x));
        }
    else
        File.write((char*) &i , sizeof (i));
    }
    File.close() ;
}

```

If the function modify() modifies a record in the file “ item.dat “ with the values of item x passed as argument, write the appropriate parameter for the missing parameter in the above code, so as to modify record at its proper place.

4. Observe the program segment carefully and answer the question that follows:

```

class member
{
    int member_no;
    char member_name[20];
public:
    void enterDetails( );
    void showDetail( );
    int getMember_no(){ return member_no;}
};
void update(member NEW )
{
    fstream File;
    File.open( “member.dat”, ios::binary|ios::in|ios::out) ;
    member i;
    while(File .read((char*) & i , sizeof (i)))
    {
        if(NEW . getMember_no( ) == i . getMember_no( ))
        {
            File.seekp( _____ , ios::cur ) //Parameter Missing
            File.write((char*) &NEW , sizeof (NEW));
        }
    }
    File.close() ;
}

```

If the function update() is supposed to modify a record in the file “ member.dat” with the values of member NEW passed as argument, write the appropriate parameter for the missing parameter in the above code, so as to modify record at its proper place.

5. A file named as “STUDENT.DAT” contains the student records, i.e. objects of class student. Write the command to open the file to update a student record. (Use suitable stream class and file mode(s)).

6. A file named as “STUDENT.DAT” contains the student records, i.e. objects of class student. Assuming that the file is just opened through the object FILE of fstream class, in the required file mode, write the command to position the put pointer to point to second record from the last record.
7. A file named as “STUDENT.DAT” contains the student records, i.e. objects of class student. Assuming that the file is just opened through the object FILE of fstream class, in the required file mode, write the command to position the get pointer to point to fifth record from the beginning.
8. Read the code given below and answer the question:

```
void main( )
{
    char ch = 'A';
    fstream outFile (“data.dat”, ios::out);
    outFile<<ch<<ch;
}
```

If the file contains GOOD before execution, what will be the contents of the file after execution of this code?

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

```
class student
{
    int student_no;
    char student_name[20];
    int mark;
public:
    void enterDetail( );
    void showDetail();
    void change_mark( ); //Function to change the mark
    int getStudent_no( ){ return student_no;}
};
void modify( int y )
{
    fstream File;
    File.open( “student.dat”, ios::binary|ios::in|ios::out) ;
    student i;
    int recordsRead = 0, found = 0;
    while(!found && File .read((char*) & i , sizeof (i)))
    {
        recordsRead++;
        if(i . getStudent_no( ) == y )
        {
            i . change_mark( );
            _____//Missing statement 1
            _____//Missing statement 2
            found = 1;
        }
    }
    if( found == 1)
        cout<<”Record modified” ;
    File.close() ;
}
```

```
}
```

If the function modify() is supposed to change the mark of a student having student_no y in the file “student.dat”, write the missing statements to modify the student record.

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

```
class item
{
    int item_no;
    char item_name[20];
public:
    void enterDetail( );
    void showDetail( );
    int getItem_no(){ return item_no;}
};
void modify(item x )
{
    fstream File;
    File.open( “item.dat”, ios::binary|ios::in|ios::out );
    item i;
    while(File .read((char*) & i , sizeof (i))//Statement 1
    {
        if(x . getItem_no( ) = i . getItem_no( ))
        {
            File.seekp(File.tellg( ) – sizeof(i));
            File.write((char*) &x , sizeof (x));
        }
    }
    File.close( );
}
```

If the function modify() modifies a record in the file “ item.dat” with the values of item x passed as argument, rewrite statement 1 in the above code using ios::eof() , so as to modify record at its proper place.

2 Marks Questions

Programming in C++

- What is wrong with the following while loop:
 - ```
int counter = 1;
while (counter < 100)
{
 cout << counter << “\n”;
 counter - -;
}
```
  - ```
int counter = 1;
while ( counter < 100)
    cout << counter << “\n”;
counter + +;
```
- What will be the output of following:

```
void main ( )
{
    int val = 10;
    cout << val ++ << val << ++ val;
}
```


3. Given the following code fragment:

```
int ch = 20;
cout << ch << ++ ch << ch << "\n";
```

 (i) The output of the code fragment.
 (ii) What is the effect of replacing ++ ch with ch + 1?
4. Differentiate between the output of following code fragments:
 (i)

```
int f = 1, i = 2;
while (++ i < 5)
    f *= i;
cout << f;
```

 (ii)

```
int f = 1, i = 2;
do {
    f *= i;
} while (++ i < 5);
cout << f;
```
5. Give output:

```
#include<iostream.h>
int global = 20;
void fun (int &x, int y)
{
    x = x - y; y = x * 10;
    cout << x << ', ' << y << '\n';
}

void main()
{
    int global = 8;
    fun (:: global, global);
    cout << global << ', ' << :: global << '\n';
    fun (global, :: global);
    cout << global << ', ' << :: global << '\n';
}
```
6. Give output:

```
#include<iostream.h>
int fun ( int &a, int b = 0)
{
    if (a % b == 0) return ++ a;
    else return b - - ;
}

void main()
{
    int x = 20, y = 23;
    y = fun (x, y);
    cout << x << ', ' << y << '\n';
    x = fun (y);
    cout << x << ', ' << y << '\n';
    y = fun (x);
    cout << x << ', ' << y << '\n';
}
```
7. Find output

```
#include<iostream.h>
void fun (int &A, int &B)
```

```

{
    A = A + B;
    B = A - B;
    A = A - B;
}
void main ()
{
    int a = 4, b = 18;
    fun (a, b);
    cout << a << ", " << b;
}

```

8. Give output:

```

void Change (int x[4], int i)
{
    x[i] = x[i] * I;
}
void main ()
{
    int x[ ] = { 11, 21, 31, 41 };
    for (int i = 0; i < 4; i++)
    {
        Change (x, i);
        cout << x[i] << '\n';
    }
}

```

9. Rewrite the following codes after removing errors, if any, in the following snippet. Explain each error.

```

#include<iostream.h>
void main()
{
    int x[5], *y, z[5]
    for (i = 0; i < 5; i ++
    {
        x[i] = i;
        z[i] = i + 3;
        y = z;
        x = y;
    }
}

```

10. Rewrite the following codes after removing errors, if any, in the following snippet. Explain each error.

```

void main()
{
    const int i = 20;
    const int * const ptr = &i;
    (*ptr)++;
    int j = 15;
    ptr = &j;
}

```

11. Give the output of the following program:

```
void main()
{
    char *p = "Difficult";
    char c;
    c = ++ *p ++;
    printf ("%c",c);
}
```

12. Give the output of the following program:

```
void main()
{
    int x [] = { 10, 20, 30, 40, 50};
    int *p, **q, *t;
    p = x;
    t = x + 1;
    q = &t;
    cout << *p << "," << **q << "," << *t++;
}
```

13. In the following program, if the value of N given by the user is 20, what maximum and minimum value the program could possibly display ()?

```
#include<iostream.h>
#include<stdlib.h>
void main()
{
    int N, Guessme;
    randomize();
    cin>>N;
    Guessme = random(N-10) + 10 ;
    cout<<Guessme<<endl;
}
```

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

```
#include <iostream.h>
void main()
{
    int x, sum =0;
    cin>>n;
    for (x=1;x<100, x+=2)
    if x%2=0
    sum+=x;
    cout<< "sum=" >>sum;
}
```

15. What will be the output of the following program?

```
#include <iostream.h>
void main()
{
    int A[5]={0, 3, 4, 2, 1};
    int b[5]= {0};
    int n =4;
```

```

        for ( int i=0; i<5;++i)
            b[a[i]]=a[i];
        cout<< b[0]<<b[1]<<b[2]<<b[3]<<b[4];
    }

```

16. What will be 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;
    }
}

```

17. Find the output of the following program

```

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

```

18. Find the output of the following program:

```

#include<iostream.h>
void main()
{
    long Number = 7583241;
    int First=0, Second=0;
    do
    {
        int R=Number% 10;
        if (R%2==0)
            First+=R;
        else
            Second+=R;
        Number /=10;
    } while (Number > 0);
    cout<<First-Second;
}

```

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

```
#include <iostream.h>
void main( )
{
    struct TV
    {
        char Manu_name[20];
        char Tv_Type;
        int Price = 17000;
    } New Tv;
    gets(Manu_name);
    gets(Tv_Type);
}
```

20. Identify error in the following program segment:

```
class ABC{
public:
    int read();
    char display val();
private:
    int x;
    char ch;
}
```

21. Write the output of the following program:

```
#include<iostream.h>
class Test{
    int a, b;
public:
    void set( int I, int j) { a = I; b = j;}
    void show() {cout << a << " " << b << endl;}
};

void main()
{
    Test t1, t2;
    T1.set(10,4);
    t2 = t1;
    t1.show()
    t2.show()
}
```

22. Answer the questions after going through the following class

```
class Exam
{
    int year;
public:
    Exam(int y) {year=y;} //Constructor 1
    Exam(Exam & t); //Constructor 2
};
```

- i. Create an object, such that it invokes Constructor I.
- ii. Write complete definition for Constructor 2.

23. 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 ;
    }
};
```

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

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

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

```
#include<iostream.h>
struct Pixels
{
    int Color, Style ;
}
void ShowPoint(Pixels P)
{
    cout<<P.Color,P.Style<<endl;
}
void main()
{
    Pixels Point1 = (5,3);
    ShowPoint(Point 1);
    Pixels Point2 = Point1
    Color.Point1+=2;
```

```

        ShowPoint(Point2);
    }

```

25. Write a function in C++ to count the number of uppercase alphabets present in a text file "STORY.TXT".
26. Write a function in C++ to count the number of lowercase alphabets present in a text file "STORY.TXT".
27. Write a function in C++ to count the number of alphabets present in a text file "XY.TXT".
28. Write a user defined function in C++ to read the content of a text file "JOKE.TXT", count and display the number of blank spaces present in it.
29. Write a function in C++ to count and display the number of lines starting with alphabet 'A' in a text file "MYFILE.TXT".
30. Write a function in C++ to print the count of the word "and" in the text file "Myfile.txt".
31. Write a function in C++ to write the characters entered through the keyboard into the file "myfile.txt", until a '#' character is entered.
32. Write a function in C++ to count the number of words present in the text file "MyFile.txt". Assume that each word is separated by a blank space and no blank space appears in the beginning and at the end of the file.
33. Write a function in C++ to count and display the number of student records stored in the binary file "Student.dat" . Assume that student is a structure and 10 bytes of memory is required to store each student record.
34. How many stream objects would you need to manage the following situations:
 - (a) To process three files sequentially.
 - (b) To merge two sorted files into third file.
35. Observe the program segment carefully and answer the question that follows:

```

class item
{
    int item_no;
    char item_name[20];
public:
    void enterDetail( );
    void showDetail( );
    int getItem_no( ){ return item_no;}
};
void modify(item x )
{
    fstream File;
    File.open( "item.dat", ios::binary|ios::in|ios::out );
    item i;
    while(File .read((char*) & i , sizeof (i)))
    {
        if(x . getItem_no( ) == i . getItem_no( ))
        {
            File.seekp(File.tellg( ) – sizeof(i));
            File.write((char*) &x , sizeof (x));
        }
    }
}

```

```

        File.close() ;           //Statement 1
    }

```

The function modify() modifies a record in the file “ item.dat “.State whether statement 1 is mandatory? Give explanation.

36. Write a function in C++ to calculate the average word size in the text file “MyFile.txt”.

37. Given the binary file STUDENT.DAT , containing the records of the following class:

```

class student
{
    int roll_no;
    char name[20];
    float percent;
public:
    void getData();
    void show();
    float returnPercent()
    {
        return percent;
    }
};

```

Write a function BELOW75() in C++ , that would count and display the records of those students whose score is below 75 percent.

38. Write a function which takes pointers to two strings as parameter and compare these strings. The function should return 1 if two strings are same otherwise return 0.

39. Give the output of the following program(Assume all necessary header files are included) :

```

void main( )
{
    char * x = “teAmIndia”;
    char c;
    c = ++ *x ++;
    cout<<c;
}

```

40. Give the output of the following program(Assume all necessary header files are included) :

```

void main( )
{
    char *x = “teAmIndia”;
    char c;
    c = ( *(x+1) ) ++ ;
    cout<<c;
}

```

41. Give the output of the following program(Assume all necessary header files are included) :

```

void main( )

```



```

    {
        char * x = "teAmIndia";
        char c;
        c = ++( *(x+1) );
        cout<<c;
    }

```

42. What will be the output of the program(Assume all necessary header files are included) :

```

#include<iostream.h>
void print (char * p )
{
    p = "pass";
    cout<<"value is "<<p<<endl;
}
void main( )
{
    char * x = "Best of luck";
    print(x);
    cout<<"new value is "<<x<<endl;
}

```

Data Structure: Array, Stack and Queue

Convert the following infix expressions to postfix expressions

1. $((x*y - a*b) - d/f) + a * b$
2. $(a + (((b - (c*d - e) + f) / g)) * (h - j))$
3. $A + B * (P + Q) ^ C / D$
4. $A + B - C * D + F - G$
5. $A ^ B - A / (B * (A - B - A * D) / B)$
6. $A + (((B - C) * (D - E) + F / G) ^ (H - J))$
7. $(A + B) * (C ^ (D - E) + F - G)$
8. $A * (B + (C + D) * (E + F) / G) * H$
9. $A * (B + C) / D - E - (F + G / H)$
10. $A + B * C ^ D - (E / F - G)$
11. $A - B + C * D ^ E * G / H$
12. $((A + B) - ((C * D) * E / F)) * G$
13. $(TRUE \ \&\& \ FALSE) \ || \ ! \ (FALSE \ || \ TRUE)$
14. $(A + B * C) / D + E / (F * G + H / I)$
15. NOT A OR NOT B AND NOT C

Evaluate the following postfix expression E given below, show the contents of the stack during the evaluation

16. $E = 10, *, 15, -, 25, 5, /, 2, +$
17. $E = 7, 6, 2, ^, *, 18, +$

- E= 5,9,+2,*4,1,1,3,-,*,-
 18 E= 120,45,20,+25,15,-,+,*
 19 TRUE FALSE TRUE FALSE NOT OR TRUE OR AND
 20 E= 30,5,2,^,12,6,/,+,-
 21 15, 3, 2, +, /, 7, + 2, *
 22 25, 8, 3, -, / 6, *, 10 +
 23 $AB - CD + E * +$ WHERE A = 5, B = 3, C = 5, D = 4 AND E = 2
 24 7,6, +, 8, *, 2, -, 3, *, 2, 4, *, -,
 25 8, 7, +, 9, 8, +, -, 2, /, 3,4, * 2, / +
 26 E= 5,20,15,-,*25,2,*,+
 27 IF A=2,C=3,D=2,E=5,F=4,G=6
 $EFG^AD*AC/- +$

Boolean Algebra

- 1
- 2 Minimize $F(A,B,C) = A'BC+AB'C'+AB'C+AB+A'B'$ using Karnaugh Map
- 3 Minimize the 4 variable Boolean function
 $F(A,B,C,D)= ABC'D+A'BCD+A'B'C+A'B'D'+AC'+A'B'C+B'$
- 4 Draw the circuit for the following function using NAND Gate
 $F(A,B,C,D)=D(A+B(C+A')+B')$
- 5 Design $(A+B).(C+D)$ using NOR Gate.
- 6 Simplify the following Boolean Expression using Boolean postulates and laws of Boolean Algebra.
 (a) $E=xyz + x'y+xyz'$
 (b) $Z=(a'+a).b'.c+a.b'.c'+a.b.(c+c')$
- 7 Simplify the following Boolean Expression using Boolean postulates and laws of Boolean Algebra.
 $X= a'.b'.c'+a'.b'.c+a.b'.c'+a.b'.c$
- 8 Simplify the following Boolean Expression using Boolean postulates and laws of Boolean Algebra.
 $F = (A+B'+C+D').(A'+B'+C+D).(A+B'+C+D').(A'+B'+C+D').(A'+B+C+D')$
- 9 Prove $x'.y'+y.z = x.y'.z'+x'.y'.z+x'.y.z+x.y.z$ algebraically.
- 10 A Boolean function F defined on three input variable X,Y,Z is 1 if and only if the number of 1(One) input is odd (e.g. F is 1 if X=1,Y=0,Z=0). Draw the truth table for the above function and express it in canonical sum of product form.
- 11 Draw the logic circuit diagram of the following expression using NOR Gate only $P = (x'+y'+z')(x+y'+z)(x+y+z')$.
- 12 Check the validity of the following Boolean Expression:
 $(y+z)(z+x)=(x'+y')(x'+z')(y'+z')$
- 13 Prove that $(a'+b')(a'+b)(a+b)=a'b'$.
- 14 Simplify $AB+(AC)'+AB'C(AB+C)$ algebraically.

- 15 Convert $(A+B)(AB'+AC)(A'C'+B'C')$ to SOP form.
- 16 Convert $(A+B)(B'+C)(A'+C)$ to SOP Form.
- 17 Prove $XY+YZ+Y'Z=XY+Z$ algebraically.
- 18 Draw the Truth Table for XOR and XNOR Gate.
- 19 Prove that NAND and NOR Gate are universal gate.
- 20 Explain the Relation ship between minterms and maxterms. An Expression is given in SOP form $F(x,y,z)=\sum(0,1,4,5)$ show its min terms and maxterms.
- 21 Represent $(A'+B'+C')(A+B'+C')$ in NOR to NOR logic network.
- 22 Draw the simplified logic diagram using only NAND gates to implement the three input function f denoted by the expression (Not By using K Map) $F=\sum(0,1,2,5)$
- 23 Express $P+Q'R$ in canonical SOP Form and POS Form.
- 24 Express the Boolean Function $F(x,y,z) = xy+x'z$ in a product of max term form.
- 25 Write the equivalent canonical Sum of Product expression for the following Product of Sum Expression $F(X,Y,Z)=\pi(1,3,6,7)$
- 26 A majority gate is a digital circuit whose output is equal to 1 if the majority of the inputs are 1. The output is 0 otherwise. By means of a truth table, find the Boolean expression implemented by 3 input majority gates.
- 27 An even parity gate is a digital circuit whose output is equal to 1 if the odd numbers of inputs are 1. The output is 0 otherwise. By means of a truth table
 - (a) Find the Boolean function implemented by a 3 input odd parity gate.
 - (b) Which single gate can be used to represent this circuit

3 Marks Questions

Programming in C++

- 1 Give output of following code fragment:


```
int val, res, n = 1000;
cin >> val;
res = n + val > 1750 ? 400 : 200;
cout << res;
```

 - (a) if the input is 2000.
 - (b) if the input is 1000.
 - (c) if the input is 500.
- 2 What will be the output if input is:

(i) a	(ii) c	(iii) d	(iv) h	(v) b
-------	--------	---------	--------	-------

```
char ch, out [10] = " ";
cin >> ch;
switch (ch) {
    case 'a':    strcat(out, "a");
    case 'b':    strcat(out, "b");
    case 'c':    strcat(out, "c");
                break;
    case 'd':    strcat(out, "d");
                break;
    default :    strcat(out, "Not abcd");
}
```

```

    }
    cout << out << endl;

```

3 Give output of following code fragment:

```

char *msg = "a ProFile";
for (int i = 0; i < strlen (msg); i++)
if (islower(msg[i]))
    msg[i] = toupper (msg[i]);
else
    if (isupper(msg[i]))
    if( i % 2 != 0)
        msg[i] = tolower (msg[i-1]);
    else
        msg[i--];
cout << msg << endl;

```

4 Give output of following code fragment:

```

5char *msg = "WELCOME";
for (int i = strlen (msg) - 1; i >= 0; i--)
if (islower(msg[i]))
    msg[i] = toupper (msg[i]);
else
    if (isupper(msg[i]))
    if( i % 2 != 0)
        msg[i] = tolower (msg[i-1]);
    else
        msg[i--];
cout << msg << endl;

```

5 Find output

```

#include<iostream.h>
struct Box {
    int Len, Bre, Hei;
};
void Dimension(Box B)
{
    cout << B.Len << " X " << B.Bre << " X ";
    cout << B.Hei << endl;
}
void main ( )
{
    Box B1 = {10, 20, 8}, B2, B3;
    ++B1.Hei;
    Dimension (B1);
    B3= B1;
    ++B3.Len;
    B3.Bre++;
    Dimension (B3);
    B2= B3;
    B2.Hei += 5;
    B2.Len - = 2;
}

```

```

        Dimension (B2);
    }
6    Give output
    int Execute( int M)
    {
        if (M % 3 = 0)
            return M * 3;
        else
            return M + 10;
    }
    void output( int B = 2)
    {
        for (int T = 0; T < B; T++)
            cout << Execute(T) << “*”;
        cout << endl;
    }
    void main()
    {
        output (4);
        output ( );
        output (3);
    }

```

7 Give the output of the following program:
void main()

```

int ar[] = {2, 3, 4, 5};
int *ptr = arr;
int val = *ptr; cout << val << endl;
val = *ptr ++; cout << val << endl;
val = *ptr;    cout << val << endl;
val = * ++ptr; cout << val << endl;

```

8 Give the output of the following program:
void main()

```

{
    int ar[] = {2, 3, 4, 5};
    int *ptr = arr;
    int val = *ptr;  cout << val << endl;
    val = *ptr ++;  cout << val << endl;
    val = *ptr;     cout << val << endl;
    val = * ++ptr;  cout << val << endl;

```

9 Give the output of the following program :
#include<iostream.h>
struct point
{

```

int x,y;
};
void showpoint p)
{
    cout<<p.x<< ':'<<p.y<<endl;
}
void main()
{
point u = {20,10},V,W;
v=u;
v.x+=20;
w=v;
u.y+=10;
u.x+=5;
w.x-=5;
show(u);
show(v);
show(w);
}

```

10. Write the output of the following program :

```

#include<iostream.h>
int calc(int u)
{
    if(u%2==0)
        return u+10;
    else
        return u*2;
}
void pattern(char M, int B=2)
{
    for(int cnt=0;cnt<b;cnt++)
        cout<<calc(cnt)<<m;
    cout<<endl;
}
void main()
{
    pattern('*');
    pattern('#',4);
    pattern('@',3);
}

```

- 11 Find the output of the following program:

```

#include<iostream.h>
#include<conio.h>
void ChangeContent(int Arr[], int Count)
{
    for(int C=1 ; C<Count ; C++)
    {
        Arr[C-1]+=Arr[C] ;
    }
}

```

```

}
void main()
{
clrscr();
int A[ ]={3, 4 , 5}, B[ ]={10,20,30,40}, C[ ]={900, 1200}, L ;
ChangeContent(A,3);
ChangeContent(B,4);
ChangeContent(C,2);
for(L=0 ; L<3 ; L++)
{
cout<<A[L]<<"#";
}
cout<<endl;
for(L=0 ; L<4 ; L++)
{
cout<<B[L]<<"#" ;
}
cout<<endl;
for(L=0 ; L<2 ; L++)
{
cout<<C[L]<<"#" ;
}
getch();
}

```

12 Find the output of the following program:

```

#include<iostream.h>
#include<conio.h>
struct Game
{
    char Magic[20];
    int Score;
};
void main()
{
clrscr();
Game M={"Tiger", 500} ;
char *Choice ;
Choice = M.Magic;
Choice[4]='P' ;
Choice[2]='L' ;
M.Score+=50;
cout<<M.Magic<<M.Score<<endl;
Game N= M;
N.Score-=120 ;
cout<<N.Magic<<N.Score<<endl;
getch();
}

```

13 Write the output of the following program:

```

#include<iostream.h>

```

```

#include<string.h>
#include<ctype.h>
void convert (char str[], int len)
{
    for (int count =0; count <len; count++)
    {
        if ( isupper(str[count]))
            str[count]=tolower(str[count]);
        else if ( islower(str[count]))
            str[count]=toupper(str[count]);
        else if ( isdigit(str[count]))
            str[count]=str[count]+2;
        else
            str[count]= '#';
    }
}

void main()
{
char text[]= "AISSCE 2008@";
int size =strlen(text);
convert (text,size);
cout<<text<<endl;
for (int c =0, r=size-1; c<=size/2;c++, r--)
{
    char temp= text[c];
    text [c]= text[r];
    text[r]= temp;
}
cout<< text << endl;
}

```

14 Give the output of the following program.

```

#include < iostream.h >
#include <conio.h >
int a = 10;
int main( )
{
    void demo ( int &, int , int *);
    clrscr( );
    int a = 20;
    demo ( ::a,a,&b);
    cout << ::a << "\t" << a << "\t" << b;
}
void demo ( int &x, int y , int *z )
{
    a += x; y *= a; *z = a+y;
    cout << x << "\t" << y << "\t" << *z << endl;
}

```

15 Write the output of the following program segment


```

char *NAME="ComPUteR";
for(int x=0;x<strlen(NAME);x++)
if(islower(NAME[x]))
    NAME[x]=toupper(NAME[x]);
else
    if(isupper(NAME[x]))
    if(x%2==0)
        NAME[x]=tolower(NAME[x]);
    else
        NAME[X]=NAME[x-1];
puts(NAME);

```

16 What will be the output of the following program

```

#include<iostream.h>
#include<ctype.h>
#include<conio.h>
#include<string.h>
void changestring(char text[], int &counter)
{
    char *ptr = text;
    int length=strlen(text);
    for(;counter<length-2;counter+=2,ptr++)
    {
        *(ptr+counter) = toupper(*(ptr+counter));
    }
}
void main()
{
    clrscr();
    int position = 0;
    char message[] = "Mouse Fun";
    changestring(Message,position);
    cout<<message<< "@" <<position;
}

```

17 What will be the output of the following program:

```

#include<iostream.h>
#include<ctype.h>
#include<conio.h>
#include<string.h>
void changestring(char text[], int &counter)
{
    char *ptr = text;
    int length=strlen(text);
    for( ;counter<length-2; counter+=2,ptr++)
    {
        *(ptr+counter) = toupper(*(ptr+counter));
    }
}
void main()

```

```

{
    clrscr();
    int position = 0;
    char message[] = "Pointer Fun";
    changestring(Message, position);
    cout<<message<< "@" <<position;
}

```

18. Find the output of the following program

```

#include<iostream.h>
#include<string.h>
class state
{
    char * state_name;
    int size;
public:
    state( ); { size=0; state_name=new char[size+1]; }
    state(char *s)
    {
        size = strlen(s) ; state_name = new char[size+1];}
        strcpy(state_name, s);
    }
    void display() {cout<<state name<<endl; }
    void Replace (state &a, state &b)
    {
        size = a.size + b.size;
        delete state_name;
        state_name = new char[size+1] ;
        strcpy(state_name, a.state_name);
        strcat(state_name, b.state_name);
    }
};
void main( )
{
    char *temp = "Delhi";
    state state1(temp), state2("Mumbai"), state3("Nagpur"), S1, S2;
    S1.Replace(state1, state2);
    S2.Replace(S1, state3);
    S1.display( );
    S2.display( );
}

```

- 19 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;
    }MOVIE;
    gets(movie_name);
    gets(movie_type);
}

```

20 Find the output of the following program:

```
#include<iostream.h>
#include<string.h>
class student
{
    char *name;
    int I;
public:
    student() {I=0; name=new char [ I+1]; }
    student (char *s)
    {   I=strlen(s); name=new char[I+1];
        strcpy (name,s);
    }
    void display() {cout<<name<<endl;}
    void manipulate(student & a, student & b)
    { I = a.I + b.I;
      delete name;
      name=new char[I+1];
      strcpy(name, a.name);
      strcat(name, b.name);
    }
};
void main( )
{   char * temp = "Jack";
    student name1 (temp), name2(" Jill"), name3("John"),S1,S2;
    S1 .manipulate (name1, name2);
    S2.manipulate (S1, name3);
    S1.display ();
    S2.display ();
}
```

21 Find the output of the following program:

```
#include<iostream.h>
#include<string.h>
class country
{
    char *country name;
    int length;
public:
    country () {length =0; country_name=new char [length+1];}
    country (char *s)
    {   length = strlen(s); country_name=new char [length +1];
        strcpy (country_name, s);
    }
    void display () { cout<< country_name <<endl;}
    void Replace (country & a, country & b)
    {   length a.length + b.length;
        delete country_name;
        country_name=new char [length + 1];
        strcpy (country_ name, a.country_name);
        strcat (country_name, b.country name);
    }
}
```

```

};
void main ( )
{
    char * temp = "India";
    country country1 (temp), country2 ("Nepal"), country3 ("China"), S1,S2;
    S1.Replace (country1, country2);
    S2.Replace (S1,country3);
    S1.display( );
    S2.display ( );
}

```

22 Find the output of the following program:

```

#include < iostream.h>
void main( )
{
    int *PointerArray [10];
    int marks [ ] = {75, 68, 90, 34, 0, 10, 90, 65};
    for (int I = 0; marks [ I]!=0; I++)
    {
        PointerArray [I]=&marks[I];
        * (PointerArray [I] ) += 5;
    }
    int index = 0;
    while(index < I )
    {
        int p=*(PointerArray[index] );
        if(p >=60) cout <<p<< ', ';
        index ++;
    }
}

```

23

```

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( );
};

```

Assuming a binary file "BOOK.DAT" contains objects belonging to class book, write a user defined function to add more records to the end of it.

24 Assuming a binary file "BOOK.DAT" contains objects belonging to class book, write a user defined function to add more records to the beginning of it.

25 Assuming a binary file "BOOK.DAT" contains ten objects belonging to class book, write a user defined function to add a record as fifth record to this file. After the execution of your code, the file "BOOK.DAT" should contain eleven records

26 A librarian maintains the record of books in a file named as "STOCK_BOOK.DAT". Write a function in C++ to delete a record for book_no 10.

27 Observe the program segment carefully and answer the question that follows:

```

class student
{
    int student_no;
    char student_name[20];
    int mark;
public:
    void enterDetails()
    {
        cin>> student_no >> mark ; gets(student_name);
    }

    void showDetail();
    int get_mark(){ return mark;}
};

```

Assuming a binary file “RESULT.DAT” contains records belonging to student class, write a user defined function to separate the records having mark

- (i) Greater than 79 into “EXCELLENT.DAT” file
- (ii) Greater than 59 but less than 80 into “AVERAGE.DAT” file.
- (iii) Remaining records should be in “RESULT.DAT” file.

28 Given the binary file TELEPHONE.DAT , containing the 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 only those records having areaCode as “123” from TELEPHONE.DAT to TELEBACK.DAT.

29 Write a function in C++ to add a new record into a binary file “customer.dat” , if the file contains the objects of the following class:

```

class customer
{
    int cust_no;
    char name[20];
public:
    void getData( )
    {

```

```

        cin>> cust_no;
        cin.getline(name, 20 );
    }

    void showData( ); // Function to display customer details

};

```

30 Given the binary file ITEM.DAT, containing the records of the following structure:

```

struct item
{
    int item_no;
    char item_name[20];
    int stock;
};

```

Implement the function AddStock(item x, int n), which updates a record by adding n to the existing stock for the item x in the file.

31 Write definition for a function SUMSEQUENCE() in C++ with two arguments/parameters – double x and int n. The function should return a value of type double and it should perform sum of the following series :

$1-x/1! + x^2/3! - x^3/5! + x^4/7! - x^5/9 + \dots$ Up to n terms.

(Note : The symbol ! represents Factorial of a number i.e. $5! = 5*4*3*2*1$)

32 Write a C++ function SUMFUN() having parameters X (of type double) and n (of type integer) with a result type as double to find the sum of the series given below :

$X + X^2/3! + X^3/5! + \dots + X^n/(2N-1)!$

33 An array of a structure Student, S is required to be arranged in descending order of marks. Write a C++ function to arrange the same with the help of bubble sort. The array and its size is required to be passed as parameters to the function.

Definition of structure student is as follows

```

struct Student
{
    int rollno;
    char name[20];
    float marks;
};

```

34 An array E containing elements of structure Employee is required to be arranged in descending order of salary. Write a C++ function to arrange the same with the help of Selection sort. The array and its size is required to be passed as parameters to the functions. Definitions of the structure is as follows

```

struct Employee
{
    int empno;
    char Ename[20];
    float salary;
};

```

35 Give the output of the following program :

```

#include<iostream.h>
#include<conio.h>
#include<string.h>
#include<ctype.h>
void main( )
{
    int b;
    char bboy[10];
    clrscr( );
    bboy[0]='d',bboy[1]='e',bboy[2]='f',bboy[3]='g';
    len(bboy);
    getch( );
    return 0;
}
void len(char boy[10])
{
    int l,v=0;
    l=strlen(boy);
    for (int i=0;i<=l;i++)
    {
        if ((boy[i]=='a')||(boy[i]=='e')||(boy[i]=='i')||(boy[i]=='o' || (boy[i]=='u'))
            v=v+1;
        }
    cout<<l<<<v;
    return;
}

```

36. Give the output of the following program :

```

#include<iostream.h>
#include<conio.h>
main( )
{
    int number[10],a,b,c,d;
    clrscr( );
    for(int i=0;i<10;i++)
    {
        number[i]=i+i;
    }
    clrscr( );
    for(int j=0;j<9;j++)

```

```

    {
        for(int k=j+1;k<10;k++)
        {
            if (number[j]>number[k])
            {
                a=number[j];
                number[j]=number[k];
                number[k]=a;
            }
        }
    }
    cout<<endl;
    for(i=0;i<10;i++)
    cout<<number[i]<<"\t";i++;
    getch( );
    return 0;
}

```

37 Give the output of the following program :

```

#include<iostream.h>
#include<conio.h>
main( )
{
int a=0;
clrscr( );
char *name;
name= "Internet Browsing";
for(a=0;a<=8;a++)
cout<<name[a+1];
cout<<endl;
cout<<name[a];
cout<<endl<<(int)name[a]-1;
getch( );
return 0;
}

```

38 Give the output of the following program :

```

#include<iostream.h>
#include<conio.h>
main( )

```



```

{
void arm(int);
clrscr( );
int num;
num=191;
arm(num);
getch( );
return 0;
}
void arm(int n)
{
int number, sum=0,dg,dgg,digit;
number=n;
while(n>0)
{
dg=n/10;
dgg=dg*10;
digit=n-dgg;
cout<<digit+digit<<endl;
sum=sum+digit*digit*digit;
n=n/10;
}
cout<<digit<<endl<<sum;
}

```

39 Give the output of the following program :

```

#include<iostream.h>
#include<conio.h>
#include<string.h>
main( )
{
clrscr( );
char *name;
int l;
name= "SHANA";
l=strlen(name);
cout<<l<<endl<<(int) name[l-2];
cout<<endl;
cout<<name[l-3];
getch( );
}

```

```
        return 0;
    }
```

40 Give the output of the following program :

```
#include<iostream.h>
#include<conio.h>
#include<stdio.h>
#include<string.h>
main( )
{
    clrscr( );
    char *name;
    int len=0;
    name= "dheeraj@lw1.vsnl.net.in";
    len = strlen(name);
    len = len-1;
    cout<<endl;
    for(int i=len;i>=0;i=i-2)
    { cout<<name[i];}
    cout<<endl;
    cout<<i;
    cout<<endl;
    cout<<name[i+4];
    cout<<endl;
    getch( );
    return 0;
}
```

41 Assuming the class Employee given below and a binary file EMPLOYEE.DAT contains objects of this class, write functions in C++ to perform the followings:

- (i) Write an object at the end of the binary file.
- (ii) Update the salary of all the employees whose salary is 10000 with a new salary 20000.

```
class Employee{
    int emp_no;
    char name[20];
    float salary;
public:
    void getData( )
    {
        cin>> emp_no>>salary;
```

```

        gets(name);
    }
void setSalary(float f )
{
    salary = f;
}
float get_salary( )
{
    return salary;
}
};

```

- 42 What is the output of the following program(Assume all necessary header files are included) :

```

void main( )
{
    char *name= "IntraNet";
    for ( int i = 0; i < strlen( name) ; i++)
    {
        if ( islower( name[i] )
            name[i] =toupper(name[i]) ;
        else
            name[i] = name[i - 1] ;
    }
}

```

- 43 What is the output of the following program(Assume all necessary header files are included) :

```

void main( )
{
    char * name= "teAmIndia";
    for ( int i = 0; name[i] != '\0' ; i + 2)
    {
        if ( islower( name[i] )
            name[i] = toupper(name[i]) ;
        else
            name[i] = tolower(name[i]);
    }
}

```

- 44 What is the output of the following program(Assume all necessary header files are included) :

```

void main( )
{

```

```

char * name= "The bESt mAN wINs";
for ( int i = 0; name[i] != '\0' ; i + 1)
{
    if ( islower( name[i] )
        name[i] = toupper(name[i]) ;
    else
        if( isupper(name[i]) )
            if ( i % 2 == 0) name[i] -- ;
        else
            name[i] = tolower(name[i - 1]
    }
}

```

- 45 What is the output of the following program(Assume all necessary header files are included) :

```

void main( )
{
    char * str = "TEACHER";
    for ( int i = strlen(str) - 1 ; i >= 0 ; i --)
    {
        for ( int x = 0 ; x <= i ; x ++ )
            cout<<s[x] ;
        cout<<"\n";
    }
}

```

- 46 What is the output of the following program(Assume all necessary header files are included) :

```

void main( )
{
    int * p[10];
    int score[] = {80, 30, 74, 50, 34, 67,0, 98};
    for ( int i = 0 ; score[i] != 0 ; i ++ )
    {
        p[i] = & score[i];
        *(p[i]) += 10;
    }
    int count = 0;
    while( count < i)
    {
        int q = *(p[count]);
        count++ ;
        if(q > 50)
            cout<<q<< " , " ;
    }
}

```

47 What will be the output of the following program :

```
#include<iostream.h>
#include<ctype.h>
#include<conio.h>
#include<string.h>
void NewText(char str[ ], int & pos)
{
    char * p = str;
    int length = strlen(p);
    for(    ; pos < length - 2; pos += 2 , p++)
    {
        *(p + pos) = toupper(*(p+pos));
    }
    cout<<str;
}
void main( )
{
    clrscr( );
    NewText("Good Morning", 0) ;
}
```

48 What is the output of the following program(Assume all necessary header files are included) :

```
#include <iostream.h>
#include<ctype.h>
#include<string.h>
#include<conio.h>
class country{
    char * c_name;
    int length;
public:
    country( )
    {
        length = 0;
        c_name = new char[length+1];
    }
    country(char * s)
    {
        length = strlen(s);
        c_name = new char[length+1];
        strcpy(c_name, s);
    }
}
```

```

void display()
{
    cout<<c_name<<endl;
}
void replace(country &a, country &b)
{
    length= a.length+b.length;
    c_name = new char[length+1];
    strcpy(c_name, a.c_name);
    strcpy(c_name, b.c_name);
}
};
void main( )
{
    char *temp="India";
    clrscr( );
    country c1=temp, c2("Nepal"),c3;
    c3.replace(c1,c2);
    c3.display( );
    getch( );
}

```

53 Find the output of the following program

```

#include<iostream.h>
void main ( )
{
    char *name;
    node *next;
}
node n[ ]={
    {"Anamika", n+1},
    {"Shruthi",n+2},
    {"Swathi",n}
};
node * m[3];

for(int i=0;i<3;i++)
    m[i]=n[i].next;

cout.write(m[0]->name,7); cout.put('\n');
cout.write((*m)->name,7); cout.put('\n');

```

49. Write a function in C++ to count the number of vowels present in a text file STORY.TXT".

BOOLEAN ALGEBRA

- 1 Solve the following $F(a,b,c,d)=\sum(0,1,3,4,5,7,8,9,11,12,13,15)$. Obtain the simplified form using K-Map.
- 2 Minimize $F(a, b, c, d) = \sum(1, 2, 3, 11, 12, 14, 15)$ using K-map.
- 3 Given the logic function $F = xyz + yz'w + x'yz$. Minimize it using K- Map.
- 4 Obtain a simplified form for the following Boolean Expression using K Map and after simplifying draw its circuit diagram.
 $F=m_0+m_1+m_2+m_4+m_5+m_7+m_8+m_9+m_{10}+m_{11}$
- 5 Obtain a simplified form for the following Boolean expression using K-Map and draw its circuit diagram.
 $F=M_0.M_1.M_3.M_5.M_8.M_{10}.M_{13}$
- 6 Obtain the simplified form of a Boolean Expression using Karnaugh Map
 $F(w,x,y,z)=\sum(0,1,2,3,4,8,9,10,11)$
- 7 Reduce the following Boolean Expression with the help of Karnaugh Map
 $F(U,V,W,Z)=\sum(0,1,2,3,12,13,14,15)$
- 8 Use K Map to simplify the Boolean function
 $F(a,b,c,d)=\sum(1,3,4,5,6,7,9,11,12,13,14,15)$
- 9 A combinational circuit has 4 inputs and one output. Output is 1 when
 - all the inputs are equal to 1
 - none of the inputs are equal to 1
 - an odd number of inputs are equal to 1
 - (a) Obtain the truth table
 - (b) Find the simplified output function in SOP Form
 - (c) Find the simplified output function in POS Form
 - (d) Draw the logic diagram
- 10 There are 4 parallel railway tracks at a place. It is desired to design a logic circuit, which can give a signal when three or more trains pass together at any given time
 - i) Draw the truth table for the above problem
 - ii) Simplify the expression using K – Map
 - iii) Draw the circuit diagram
- 11 Output of 4 input (x,y,z,w) Boolean function F is 1 when
 - i) At least two variable have the truth value 1
 - ii) At least three variable have the truth value 1
 - iii) Only when the three variable have the truth value 1Draw the truth table. Solve it by using K map in Product of Sum terms
- 12 Minimize the Boolean Expression using $XYZ+XYZ'+XY'Z'+X'Y'Z'+X'YZ$ using Karnaugh Map
- 13 Simplify for the function $F=\pi(0,3,7,8,9,12,13)$
- 14 Draw the truth table for a full adder and then simplify the Sum and Carry by using K-map. After that draw its circuit diagram.
- 15 Give the logic function $F=AB+A'B'+A'B$. Assuming the complements are available. Simplify the function using De Morgan's Theorem. Synthesize F by using NOR gates only.

4 Marks Questions

Programming in C++

1. Define a class Serial in C++ with the following specifications:
Private members of class Serial
 - ❖ Serialcode integer
 - ❖ Title 20 characters
 - ❖ Duration float
 - ❖ Noofepisodes integersPublic member function of class Serial
 - ❖ A constructor function to initialize Duration as 30 and noofepisodes as 10
 - ❖ Newserial function to accept values for serialcode and Title.
 - ❖ Otherenteries() function to assign the values of Duration and Noofepisodes with the help of corresponding values passed as parameters to this function.
 - ❖ Dispdata() function to display all the data members on the screen
2. Consider the following and answer the questions given below:

4

```
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 enroll(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 can be accessed from the object(s) of class department.
- (iv) Name the data member(s), which are accessible from the object(s) of class college.
3. Define a class *Flight* in C++ with the following specification:

Private Members:

- A Data Member Flight Number of type integer
- A Data Member Destination of type String
- A Data Member Distance of Float Type
- 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 Feed_Info() to allow user to enter values for Flight Number, Destination, Distance & Call Function CalFuel() to calculate the quantity of fuel.
- A Function Show_Fuel() to allow user to view the content of all the data members.

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

```
class MNC
{
    char Cname[25];
protected:
    char Hoffice[25];
public :
    MNC( );
    char Country[25];
    void EnterDate( );
    void DisplayData( );
};

class BRANCH:public MNC
{
    long NOE;
    char Ctry[25] ;
protected:
    void Association( );
public:
    BRANCH( );
    void Add( );
    void Show( );
};

class OUTLET: public BRANCH
{
    char State[25];
public:
    OUTLET( );
    void Enter( );
    void Output( );
};
```

- a) Which class's constructor will be called first at the time of declaration of an object of class OUTLET.
- b) How many bytes an object belonging to class OUTLET require?
- c) Name the member function(s) which are accessed from the object(S) of class OUTLET.
- d) Name the Data members which are accessible from the objects(s) of class BRANCH.

5. Consider the following and answer the questions given below

```

class CEO
{
    double Turnover;
protected:
    int Noofcomp;
public:
    CEO();
    void input(int);
    void output( );
};
class Director : public CEO
{
    int noofemp;
public:
    Director( );
    void INDATA( );
    void OUTDATE( );
protected:
    float funds;
};
class Manager: public Director
{
    float expenses;
public:
    void display(void );
};

```

- i) Which constructor will be called first at the time of declaration of object of class Manager?
- ii) How many bytes will an object belonging to the Class Manager require?
- iii) Name the member functions, which can be accessed by an object of class Manager.
- iv) Is the member function OUTPUT() accessible by the objects of the class Director

6. Define a class **TEST** with the following specification:

Private members

Testcode of type integer
 Description of type string
 NoCandidate of type integer

A member function **CALCNTR()** to calculate and return the number of centers as (NoCandidate / 100 + 1)

Public members

A constructor function to initialize Testcode as 12.

A function **IN_DATA()** to accept values for Testcode, Description, NoCandidate
 And call function **CALCNTR()**

A function OUT_DATA() to display all the data members

7. Define a class REPORT with the following specification

Private:

Adno 4 digit admission number
Name 20 characters
Marks an array of floating point values
Averge average marks obtained
Getavg() to compute the average obtained in five subjects

Public:

Readinfo() function to accept values for adno, name, marks and
 Invoke the function Getavg()
Displayinfo() function to display all data members on the screen.

8. Consider the following C++ declaration and answer the questions given below:

```
class A
{
    void any( );
protected:
    int a,b;
    void proc( );
public:
    A();
    void get( );
    void put( );
};
class B:protected A
{
    int c,d;
protected:
    int e,f;
    void get2( );
public:
    B();
    void put2( );
};
class C: private B
{
    int p;
protected:
    int q;
    void get3( );
public:
    void show3( );
};
```

- (a) Name all the member functions which are accessible by the objects of class C.
- (b) Name all the protected members of class B.
- (c) Name all the data members which are accessible from member functions of class C.
- (d) How many bytes does an object belonging to class C require?
- (e) Which class constructor will be called first at the time of declaration of an object of class C?

- (f) Is the member function `proc()`, which can be accessed from the objects of class C?
- (g) Name the base class and derived class of class B.
- (h) Name all the protected members of class C.

9. Given the following C++ code, answer the questions

```

Class TEST
{
    int time;
    public:
        TEST()                //Function 1
        {
            time=0;
            cout<< "hai";
        }
        ~ TEST()              //Function 2
        {
            cout<< "hello";
        }
        void exam()           //Function 3
        {
            cout<<"god bless u";
        }
        TEST(int Duration)    //Function 4
        {
            time=Duration;
            cout<<"Exam starts";
        }
        TEST(TEST &T)        //Function 5
        {
            time = T.Duration;
            cout<<"Exam Finished"
        }
};

```

- (a) In Object Oriented Programming, what is Function 1 referred as and when does it get invoked/called?
- (b) In Object Oriented Programming, what is Function 2 referred as and when does it get invoked / called?
- (c) Which category of constructors does Function 5 belong to and what is the purpose of using it?
- (d) Write statements that would call the member Function 1 and 4.

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

- A data member *TrainNumber* 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
<=1500	250

more than 1500 and <=3000 1000
more than 3000 2500

Public Members

- A function FEEDINFO() to allow user to enter values for the Train 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.

11. Consider the following C++ declaration and answer the questions given below:

```
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( );
};
```

- Write the names of data members, which are accessible from objects belonging to class AUTHOR.
- Write the names of all the member functions which are accessible from objects belonging to class BRANCH.
- Write the names of all the members which are accessible from member functions of class AUTHOR.
- How many bytes will be required by an object belonging to class AUTHOR?
- Write the public members of the class AUTHOR.

12. Define a class SHOP in C++ with the following description:

- Name of the owner

- Contact Number of owner
- Address of shop
- Number of employees.

Public Members

- A function READ_DATA() to read the data.
- A function WRITE_DATA() to display the data.

Declare an array of SHOP to store the information for 100 shops. Use this array in main() and display the information.

13. Define a class TESTMATCH in C++ with the following description :

Private Members

TestCode of type integer

Description of type string

Noofcandidates of type integer

Centerreqd (number of centers required) of type integer

A member function CALCULATECNTR() to calculate and return the number of centers as (NOOFCANDIDATES /100+1)

Public Members

- A function GETDATA() to allow user to enter values for Test Code, Description, Noofcandidates & call function CALCULATECNTR() to calculate the number of centers.
- A function PUTDATA() to allow user to view the content of all the data members in the following format :

```
TEST MATCH INFORMATION -----
Test Match Code      : -----
Description          : -----
Total Candidates     : -----
Centers Required     : -----
```

14. Consider the following C++ declaration and answer the questions given below:

```
class P
{
char pub[12];
double turnover;
protected:
void register( );
public:
        P( );
        void enter( );
        void display( );
};
class B
{
        char city[20];
protected:
        float employees;
public:
```

```

        B();
        void haveit( );
        void giveit( );
};
class A: private B, public P
{
        int acode;
        char aname[20];
        float amount;
public:
        A( );
        void start( );
        void show( );
};

```

- Write the names of data members which are accessible from objects belonging to class A.
- Write the names of all the member functions which are accessible from objects belonging to class B.
- Write the names of all the members which are accessible from member functions of class A.
- How many bytes will be required by an object belonging to class A?
- Write the public members of the class A.

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

```

class Interview
{   int month;
    public:
        Interview (int y) {month=y ;}    //Constructor 1
        Interview (Interview &t);        //Constructor 2
};

```

- Create an object, such that it invokes Constructor 1
- Write complete definition for Constructor 2

16. Define a class named **ADMISSION** in C++ with the following descriptions:

Private members:

AD_NO integer (Ranges 10 - 2000)

NAME Array of characters (String)

CLASS Character

FEES Float

Public Members:

- Function Read_Data () to read an object of **ADMISSION** type
- Function Display() to display the details of an object
- Function Draw_Nos () to choose 2 students randomly and display the details. Use random function to generate admission nos to match with AD_NO.

17. Answer the questions (i) to (iii) based on the following code:

```

class stationary
{
        char Type;
        char Manufacturer [10];
};

```

```

    public:
    stationary();
    void Read_sta_details();
    void Disp_sta_details();
};
class office: public stationary
{
    int no_of_types;
    float cost_of_sta;
    public:
    void Read_off_details();
    void Disp_off_details();
};
class printer: private office
{
    int no_of_users;
    char delivery_date[10];
    public:
    void Read_pri_details();
    void Disp_pri_details();
};
void main ()
{
    printer MyPrinter;
}

```

(a) Mention the member names which are accessible by MyPrinter declared in main() function.

(b) What is the size of MyPrinter in bytes?

(c) Mention the names of functions accessible from the member function Read_pri_details() of class printer.

18. Define a class named HOUSING in C++ with the following descriptions:

Private members

REG_NO	integer(Ranges 10 — 1000)
NAME	Array of characters (String)
TYPE	Character
COST	Float

Public Members

- Function Read_Data() to read an object of HOUSING type.
- Function Display() to display the details of an object.
- Function DrawNos() to choose and display the details of 2 houses selected randomly from an array of 10 objects of type HOUSING. Use random function to generate the registration nos. to match with REGNO from the array.

19. Answer the questions (i) to (iii) based on the following code:

```

class furniture
{
    char Type;
    char Model[10];
    public:
    furniture();
    void Read_fur_details();
    void Disp_fur_details();
}

```



```

};
class sofa : public furniture
{
    int no_of_seats;
    float cost_of_sofa;
public:
    void Read_sofa_details( );
    void Disp_sofa_details( );
};
class office: private sofa
{
    int no_of_pieces;
    char delivery_date[10];
public:
    void Read_office_details( );
    void Disp_office_details( );
};
void main( )
{
    office MyFurniture; }

```

- (a) Mention the member names which are accessible by MyFurniture declared in main () function.
- (b) What is the size of MyFurniture in bytes?
- (c) Mention the names of functions accessible from the member function Read_office_details () of class office.

20. Define a class named MOVIE in C++ with the following description:

Private members

HALL_NO	integer
MOVIE_NAME	Array of characters (String)
WEEK	integer (Total number of weeks the same movie is shown)
WEEK_COLLECTION	Float
TOTAL_COLLECTION	Float

Public Members

- Function Read_Data() to read an object of ADMISSION type
- Function Display() to display the details of an object
- Function Update() to update the total collection and Weekly collection once in a week changes. Total collection will be incremented by Weekly collection and Weekly collection is made Zero

21. Answer the questions (i) to (iii) based on the following code:

```

class toys
{
    char Code;
    char Manufacturer [10];
public:
    toys( );
    void Read_toy_details ( );
    void Disp_toy_details( );
};
class electronic : public toys
{

```

```

    int no_of_types;
    float cost_of_toy;
    public:
    void Read_elect_details ();
    void Disp_elect_details ();
};
class infants : private electronic
{
    int no_of_buyers;
    char delivery date[10];
    public:
    void Read_infant_details ();
    void Disp_infant_details();
};
void main ()
{
    infants MyToy;
}

```

- (a) Mention the member names which are accessible by MyToy declared in main () function.
- (b) What is the size of MyToy in bytes?
- (c) Mention the names of functions accessible from the member function Read_infant_details () of class printer.

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

```

class CUSTOMER
{
    int cust_no;
    char cust_name[20];
    protected:
    void Register();
    public:
    CUSTOMER();
    void status();
};
class SALESMAN
{
    int salesman_no;
    char salesman_name[20];
    protected:
    float salary;
    public:
    SALESMAN();
    void enter();
    void show();
};
class SHOP: private CUSTOMER, public SALESMAN
{
    char voucher_no[10];
    char sales_date[8];
    public:
    SHOP();
}

```

```

        void sales_entry( );
        void sales_detail( );
};

```

- (i) Write the names of data members which are accessible from objects belonging to class CUSTOMER.
- (ii) Write the names of all the member functions which are accessible from objects belonging to class SALESMAN.
- (iii) Write the names of all the members which are accessible from member functions of class SHOP.
- (iv) How many bytes will be required by an object belonging to class SHOP?

23 Answer the questions (i) to (v) based on the following code :

```

class Employee
{
    int id;
    protected:
    char name[20];
    char doj[20];
    public :
    Employee( );
    ~Employee( );
    void get( );
    void show( );
};
class Daily_wager : protected Employee
{
    int wphour;
    protected :
    int nofhworkeed;
    public :
    void getd( );
    void showd( );
};
class Payment : private Daily_wager
{
    char date[10];
    protected :
    int amount;
    public :
    Payment( );
    ~Payment( );
    void show( );
};

```

- (i) Name the type of Inheritance depicted in the above example.
- (ii) Name the member functions, which are accessible by the objects of class Payment.
- (iii) From the following, Identify the member function(s) that can be called directly from the object of class Daily_wager class show(), getd(), get()

- (iv) Find the memory size of object of class Daily_wager.
- (v) Is the constructors of class Employee will copied in class Payment? Due to inheritance.

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

```
class World
{
int H;
protected
int s;
public:
void INPUT(int);
void OUTPUT();
};
class Country : private World
{
int T;
protected:
int U;
public :
void INDATA(int, int);
void OUTDATA();
};
class State : Public Country
{
int M;
public :
void DISPLAY(void);
};
```

- (i) Name the base class and derived class of the class Country.
- (ii) Name the data member that can be accessed from function DISPLAY()
- (iii) Name the member functions, which can be accessed from the objects of class State.
- (iv) Is the member function OUTPUT() accessible by the objects of the class Country ?

25 Answer the questions (i) to (iv) based on the following class declaration:

```
class Medicine
{
char category[10];
char Date_of_Manufacture[10];
char Date_Of_Expiry[10];
protected:
char company[20];
public:
int x,y;
```

```

    Medicine();
    void Enter();
    void Show();
};
class Tablet :protected Medicine
{
    protected:
        char tablet_name[30];
        char volume_label[20];
        void disprin();
    public:
        float price;
        Tablet();
        void enterdet();
        void showdet();
};
class PainReliever : public Tablet
{
    int Dosage_units;
    long int tab;
    char effects[20];
    protected:
    I    int use_within_Days;
    public :
        PainReliever();
        void enterpr();
        showpr();
};

```

- (i) How many bytes will be required by an object of class Drug and an object of class PainReliever respectively.
- (ii) Write names of all the data members which are accessible from the object of class PainReliever.
- (iii) Write names of all member functions which are accessible from objects of class PianReliever.
- (iv) Write the names of all the data members which are accessible from the functions enterpr().

26 Consider the following declarations and answer the questions given below:

```

class Animal
{
    int leg;
    protected:
    int tail;
    public:
    void INPUT (int );
    void OUT ();
}

```

```

};
class wild : private Animal
{
    int carniv;
    protected:
    int teeth;
    Public:
    void INDATA (int, int )
    void OUTDATA( );
};
class pet : public Animal
{
    int herbiv;
    public:
    void Display (void);
};

```

- (i) Name the base class and derived class of the class wild.
- (ii) Name the data member(s) that can be accessed from function Display ().
- (iii) Name the member function(s), which can be accessed from the objects of class pet.
- (iv) Is the member function OUT () accessible by the objects of the class wild?

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

```

class vehicle
{
    int wheels;
    protected:
    int passenger;
    public:
    void inputdata( );
    void outputdata( );
};
class heavyvehicle : protected vehicle
{
    int diesel_petrol;
    protected:
    int load;
    public:
    void readdata(int, int);
    void writedata( );
};
class bus : private heavyvehicle
{
    char make[20];
    public:
    void fetchdata( );
};

```

```
void displaydata( );
```

```
};
```

- i) Name the base class and derived class of heavyvehicle class.
- ii) Name the data member(s) that can be accessed from the function displaydata().
- iii) How many bytes will be required by an object of vehicle and heavyvehicle classes respectively?
- iv) Is the member function outputdata() accessible to the objects of the class heavyvehicle?

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

```
class Book
{
int year_publication;
char title[25];
float price;
public:
    Book( );
    void input_data( );
    void output_data( );
};
class Tape
{
    char comp_name[20];
protected:
    char comp_addr[35];
public:
    Tape( );
    void read_data( );
    void show_data( );
};
class Publication : private Book , public Tape
{
    int no_copies;
public:
    Publication( );
    void Pub_Entry( );
    void Pub_Detail( );
};
```

- (i) Write the names of data members which are accessible from objects belonging to class Publication.
- (ii) Write the names of all the member functions which are accessible from objects belonging to class Tape.
- (iii) Write in which order the constructors will be invoked when an object of class Publication is created .
- (iv) How many bytes will be required by an object belonging to class Publication?

- 29 Consider the following declarations and answer the questions given below:

```
class Mydata
{
    protected:
    int data;
    public:
    void Get_mydata(int);
    void Manip_mydata(int);
    void Show_mydata(int);
    Mydata( );
    ~Mydata( );
};
class Personal_data
{
    protected:
    int data1;
    public:
    void Get_personaldata(int);
    void Show_personaldata(int);
    Personal_data1( );
    ~Personal_data1( );
};
class Person: public Mydata, Personal_data
{
    public:
    void Show_person(void);
    Person( );
    ~Person( );
};
```

- i) How many bytes will be required by an object belonging to class Person?
 - ii) Which type of inheritance is depicted in the above example?
 - iii) List the data members that can be accessed by the member function Show_person().
 - iv) What is the order of constructor execution at the time of creating an object of class Person?
- 30 Assuming the class Account given below and a binary file BANK.DAT contains objects of this class, write functions in C++ to perform the followings:
- (i) Deposit (), which deposits amount x to account number y.
 - (ii) Withdraw (), which withdraws amount x from account number y.

```
class Account{
    int acc_no;
    char name[20];
    float balance;
```



```

public:
    float getBalance( )
    {
        return ;balance
    }
    void setBalance(float f )
    {
        salary = f;
    }
    int get_acc_no( )
    {
        return acc_no;
    }
};

```

Data Structure (Array, Stack, Queue)

- 1 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;
};

```
- 2 Write a function in C++ to combine the contents of two equi-sized arrays A and B by computing their corresponding elements with the formula $2 * A[i] + 3 * B[i]$, where value I varies from 0 to N-1 and transfer the resultant content in the third same sized array.
- 3 Write a function in C++ to merge the contents of two sorted arrays A and B, into the third array C. Assume array A is sorted in ascending order, B is sorted in descending order, the resultant array is required to be in ascending.
- 4 Write a function in C++ which will accept a 2 D Array of integer and return the sum of all the elements divisible by 5 that lie on the even row number.
- 5 Assume an array A containing elements of structure Accountant is required to be arranged in descending order of salary. Write a C++ program to arrange the same with the help of bubble sort. The array and its size is required to be passed as parameters to the functions. Definition of structure Account is as under:


```

struct Account
{
    int Accno;
    char AName[25];
};

```
- 6 Given two arrays of integers x and y of sizes m and n respectively. Write a function named MERGE() which will produce a third array named z, such that the following sequence is followed:
 - (i) All odds numbers of x from left to right are copied into z from left to right.
 - (ii) All even number of x from left to right are copied into z from right to left.
 - (iii) All odd numbers of y from left to right are copied into z from left to right.
 - (iv) All even number of y from left to right are copied into z from right to left.

Eg: x is {3,2,1,7,6,3}
 And y is {9,3,5,6,2,8,10}
 Then z = {3,1,7,3,9,3,5,10,8,2,6,6,2}

- 7 Write a program to multiply two given 2D Matrices using functions.
- 8 Write a user defined function named upperhalf() which takes a 2D array A, with size n rows and n cols as arguments and print the upper half of the matrix
- ```
1 2 3 1 2 3
6 7 8 7 8
2 3 4 4
```
- 9 Write a user defined function named lowerhalf ( ) which takes a 2D array, with size n, n rows and n cols as arguments and prints the lower half of the matrix.
- Eg;
- ```
1 2 3           1
5 6 7           5 6
9 1 2           9 1 2
```
- 10 Write a function in C++ which accepts an integer array and its size as arguments and replaces elements having even values with its half and elements having odd values with twice its value .
 eg:
 if the array contains
 3, 4, 5, 16, 9
 then the function should be rearranged as
 6, 2, 10, 8, 18
- 11 Write a function in C++ which accepts an integer array and its size as argument / parameters and assign the elements into a two dimensional array of integers in the following format.
 If the array is 1 2 3 4 5 6
- ```
1 2 3 4 5 6
1 2 3 4 5 0
1 2 3 4 0 0
1 2 3 0 0 0
1 2 0 0 0 0
1 0 0 0 0 0
```
- 12 Consider the following statements
- ```
Char ch,ch1='A';
Char *p,*p1=&ch1;
*p1=ch1+1;
*p=ch;
```
- Suppose each character occupies 2 bytes of memory. If the value assigned to ch is stored in address 0x22 and the value assigned to ch1 is stored in address 0x105 then
- what value is assigned to p1;
 - what is the value of *p1;
 - what value is assigned to ch?
 - What value is assigned to *p?
- 13 Write a function in C++ which accepts a 2D array of integers and its size as arguments and displays the elements of middle row and the elements of middle column. Assuming the 2D array to be a square matrix with odd dimensions i.e., 3x3, 5x5, 7x7

eg.,

```
4 5 6
7 8 9
3 2 1
```

output through the function should be

middle row 7 8 9

middle col. 5 8 2

- 14 Define a function `Reversearray(int[], int)` that would accept a one dimensional integer array `NUMBERS` and its size `N`. The function should reverse the content of the array without using any second array.
Note: use the concept of swapping the elements.
Eg; if the array initially contains
2,15,7,8,10,1,13
after swapping should contain 31,1,10,8,7,15,2
- 15 Given an array named `A` with following elements
3,-5,1,3,7,0,-15,3,-7,-8
write a C++ function to shift all the negative numbers to left so that the resultant array may look like
-5,-15,-7,-8,3,1,3,7,0,3
- 16 Write a function in C++ which accepts an integer array and its size as arguments and swaps the elements of every even location with its odd location
eg., if the array initially contains
2, 4, 1, 6, 5, 7, 9, 2, 3, 10
then it should contain
4, 2, 6, 1, 7, 5, 2, 9, 10, 3
- 17 From a 2D array `ARR[3][3]` write a program to prepare one dimensional array `ARR2[9]` that will have all the elements of `ARR` as if they are stored in row major form.
1 2 3
4 5 6
7 8 9
then should contain 123456789
- 18 Consider a 1D array `A` containing `N` integers. Develop an algorithm to do the following.
(i) Remove all occurrences of a given integer
(ii) Shift the elements of the array to the right so that unused space is available at the left end.
(iii) Fill the unused spaces with zero.
- 19 Arrange the following array of integers in ascending order using bubble sort technique.
Array elements are: 26, 21, 20, 23, 29, 17, 14
- 20 Write a function `check()` to check if the passed array of 10 integers is sorted or not. The function should return 1 if arranged in ascending order, -1 if arranged in descending order, 0 if it is not sorted.
- 21 Suppose a company keeps single dimensional array `YEAR[100]` such that `YEAR[K]` contains the number of employees appointed in the year `K`. Write a C++ program for each of the following task:
a. To print each of the years in which no employee was appointed.
b. To find the number of years in which no employee was appointed.
- 22 Write a user defined function in C++ to find the sum of all positive numbers of a 2D array `ARC`

- [7][7] containing integers.
- 23 Write an interactive menu driven program to create two 3x3 matrices and carry out the following operations.
- Sum of two matrices
 - difference of two matrices
 - Product of two matrices
- Display the input and output matrices in proper matrix form. While creating the matrix keep in mind that each input must not exceed 20.
- 24 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;
};
```

- 25 Write a function in C++ to perform insert operation in dynamically allocated Queue containing names of students.
- 26 Write a function in C++ to perform push operation in a dynamically allocated stack containing admission number of students. Also declare the relevant class/ structure and pointers.
- 27 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 ();
};
```

- 28 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();
};
```

- 29 Define function `stackpush()` to insert nodes and `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( );
};
```

- 30 Consider the following portion of a program which implements passengers Queue for a bus. Write the definition of function `Insert()` to insert a new node in the queue with required information.

```
struct Node
{
    float U,V;
    Node *Link;
};
class QUEUE
{
    Node *Rear, *Front;
public:
    QUEUE() { Rear =NULL; Front= NULL;}
    Void INSERT ( );
    Void DELETE ( );
    ~QUEUE ( );
};
```

- 31 Give the necessary declaration of a linked list implemented queue containing float type values . Also write a user defined functions in C++ to add and delete a float type number in the queue.
- 32 An array `x[8][20]` is stored in the memory with each element requiring 2 bytes of storage. If the base address of the array is 2500, calculate the location of `x[5][5]` when the array `x` is stored using the column major order and row major order.
- 33 An array `Arr[1..20][1..20]` is stored in the memory with each element requiring 4 bytes of storage. If the base address of array `Arr` is 2000, determine the location of `Arr[15][9]` when the array `Arr` is stored in (1) Row wise and (2) Column wise.
- 34 An array `MAT[30][10]` is stored in the memory row wise with each element occupying 8 bytes of memory. Find out the base address and the address of the element `MAT[15][5]`, if the location of `MAT[5][7]` is stored at the address 3000.
- 35 An array `MAT[20][25]` is stored in the memory with each element requiring 2 bytes of storage. If the base address of `MAT` is 4000 `MAT[[12][8]` when the array stored in (i) RMO and (ii) CMO
- 36 An array `ARR[15][20]` is stored in the memory, along the row with each element occupying 4 bytes . Find out the base address and the address of the element `ARR[3][2]` if the element `ARR[5][2]` is stored at the address 1500.

- 37 If an array $B[11][8]$ is stored as column wise and $B[2][2]$ is stored at 1024 and $B[3][3]$ at 1084, find the address of $B[5][3]$ and $B[1][1]$.
- 38 An array $Arr[50][100]$ is stored in the memory along the row with each element occupying 2 bytes. Find out the address of the location $ARR[20][50]$ if location of $Arr[20][30]$ is 1350.
- 39 An array $x[30][10]$ is stored in the memory with each element requiring 4 bytes of storage. If the base address of x is 4500, find out memory locations of $x[12][8]$ and $x[2][4]$, if the content is stored along the row.
- 40 An array $ARR[15][35]$ is stored in the memory along the column with each of its elements occupying 8 bytes. Find out the base address and the address of an element $ARR[2][5]$, if the location is stored at the address 4000
- 41 An array $X[15][10]$ is stored in memory with each element requiring 2 bytes of storage. If the base address of array is 2000, calculate the location of $X[7][8]$ when the array is stored by (1) row major order (2) column major order.
- 42 $X[1..6][1..10]$ is a two dimensional array. The first element of the array is stored at location 100. Each element of the array occupies 6 bytes. Find the memory location of $X[2][4]$ when (i) array is stored row wise. (ii)array is stored column wise
- 43 Each element of an array $A[-20..20,10..35]$ requires one byte of storage. If the array is stored in column major order beginning location 500, determine the location of $A[0,30]$.
- 44 An array $S[35][15]$ is stored in the memory along the row with each of its elements occupying 4 bytes. Find out the memory location for the element $S[20][5]$, if an element $S[2][2]$ is stored at the memory location 3000.
- 45 Given the two dimensional array $a[10][20]$ base address of a is 100 and width of each element is 4 bytes. Find the location of $a[8][15]$ when the array is stored as column-wise and row-wise
- 46 An array $A[-2..8][-2..5]$ is stored in the memory along the column with each element occupying 4 bytes. Find out the address of the element $A[3][2]$.
- 47 An Array $Val[1..15][1..10]$ is stored in the memory with each elements requiring 4 bytes of storage. If the base address of array Val is 1500, determine the location of $Val[12][9]$ when the array Val is stored (i) row wise (ii) column wise.
- 48 A 2-d array defined as $A[4..7, -1..3]$ requires 2 words of storage space for each element. calculate the address of $A[6,2]$, given the base address as 100, also calculate the address of $A[7,0]$ If the array is stored in row major order
- 49 If an array $B[11][8]$ is stored as column wise and $B[2][2]$ is stored at 1024 and $B[3][3]$ at 1084. Find out the base address, size of an element and address of $B[5][3]$.
- 50 An array $ARR[35][15]$ is stored in the memory along the row with each of its element occupying 4 bytes. Find out the base address and the address of an element $ARR[20][5]$, if the location $ARR[2][2]$ is stored at the address 3000.
- 51 An array $S[40][30]$ is stored in the memory along the row with each of the element occupying 4 bytes, find out the memory location for the element $S[15][5]$, if an element $s[20][10]$ is stored at memory location 5700
- 52 An array $ARR[10][20]$ is stored in the memory with each element occupying 2 bytes of space. Assuming the base address of ARR to be 800,compute the address of $ARR[9][11]$, when the array is stored as :
- i) Row wise ii) Column wise
- 53 An Array $Val[1..15][1..10]$ is stored in the memory with each elements requiring 4 bytes of storage. If the base address of array Val is 1500, determine the location of $Val[12][9]$ when the array Val is stored (i) row wise (ii) column wise.

- 54 A 2D array defined as $A[4..7, -1..3]$ requires 2 words of storage space for each element. calculate the address of $A[6,2]$, given the base address as 100, also calculate the address of $A[7,0]$, if the array is stored in row major order
- 55 An array $ARR[35][15]$ is stored in the memory along the row with each of its element occupying 4 bytes. Find out the base address and the address of an element $ARR[20][5]$, if the location $ARR[2][2]$ is stored at the address 3000.
- 56 An array $S[40][30]$ is stored in the memory along the row with each of the element occupying 4 bytes, find out the memory location for the element $S[15][5]$, if an element $s[20][10]$ is stored at memory location 5700.
- 57 An array $ARR[10][20]$ is stored in the memory with each element occupying 2 bytes of space. Assuming the base address of ARR to be 800, compute the address of $ARR[9][11]$, when the array is stored as :
- i) Row wise
 - ii) Column wise
- 58 An array $J[15][10]$ is stored in memory with each element requiring two bytes of storage. If the base address of J is 3000, determine the location of $J[8][7]$ when the array J is stored by (i) Row Major, (ii) Column Major.
- 59 An array $X[1...160][1...10]$ is a two dimensional array. The first element of the array is stored at location 100. Each element of array occupies 6 bytes. Find the memory location of $X[2][4]$ when array is stored in row wise and column wise.
- 60 Write a function in C++ to find the sum of both left and right diagonal elements from a two dimensional array (Matrix).
- 61 An array K containing double datatype is arranged in ascending order. Write a user defined function in C++ to search for a number from K with the help of binary search method. The function should return an integer 0 to show absence of the number and integer 1 to show presence of the number in the array. The function should have the parameters as (i) an array K (ii) the number $DATA$ to be searched (iii) number of elements N .
- 62 Suppose X , Y and Z are arrays of integers of size M , N and $M+N$ respectively. The numbers in the array X appear in ascending order whereas in array Y are descending order. Write a user defined function to merge the two arrays into third array Z in ascending order.
- 63 Write a function in C++ which accepts an integer array and its size as arguments and replaces elements having odd values with thrice its value and elements having even values with their squares.
- 64 Write a program to create and display the list of patients in a small hospital using linked list data structure. Each node contains the name of the patient, age and admission number.
- 65 Each node of a stack contains the following information in addition to pointer field:
- (i) Name of the City
 - (ii) Pincode of the City
- Give the Structure of node for the linked stack in question. Top is a pointer that points to the topmost node of the stack. Write the following functions:
- (a) $PUSH ()$: To push a node into the stack, which is allocated dynamically.
 - (b) $POP ()$: To remove a node from the stack and release the memory.
- 66 Class Stack
- ```
{
 int data[10];
 int top;
 public:
```

```

 stack () {top = -1;}
 void push(); // To push an element into the stack
 void pop(); // To pop an element from the stack
 void Delete(int ITEM); // To delete all elements that are equal to ITEM
 };

```

Complete the class with all function definitions. Use another stack to transfer data temporarily.

67 For a circular queue with 5 memory locations, show diagrammatically the status of the queue after each of the following operations:

- (i) 1, 2 and 3 inserted.
- (ii) 1 deleted
- (iii) 4, 5, inserted
- (iv) 2, 3 deleted
- (v) 6 inserted and 4 deleted
- (vi) 7, 8 inserted
- (vii) 5, 6 deleted
- (viii) 11 inserted
- (ix) 7, 8 deleted and 11 deleted

68 For a circular queue with 5 memory locations show diagrammatically the status of the FRONT and REAR after each of the following operations:

- (i) E, D and C inserted.
- (ii) E deleted
- (iii) G, H inserted
- (iv) D, C deleted
- (v) F, K inserted
- (vi) G deleted
- (vii) W, X inserted
- (viii) H, F deleted
- (ix) L inserted
- (x) X deleted

69 Write an interactive menu driven program to implement circular queue using array consisting of character data value.

70 Define member function QueInsert( ) to insert and QueDel( ) to delete nodes of a linked list implemented class Queue having the following Definitions:

```

Struct Node
{
 char name[20];
 int age;
 Node *Link;
};
class Queue
{
 Node *Rear, *Front;
public:
 Queue() { Rear=NULL; Front = NULL}
 void QueInsert();
 void QueDel();
};

```

71 Write a function in C++ to INSERT operation in a dynamically allocated stack 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();
};

```

- 72 Write a function that reads 10 integers into the array A. Use another integer array P of same size to store each index of the array A in the following way:  
The index of the first smallest element in A is stored at index 0 of P, the index of the next smallest element in A is stored at index 1 of P and so on. Print the next smallest element in A ordered in the sequence given by each succeeding index stored in P.
- 73 Write a user defined function to sort the given array using Selection sort mechanism.  
int A[ ] = {10,14,126,23,26,33,44,48,50,55,60,66};  
Print array after each iteration.
- 74 Write a user defined function to search for 55 and 23 in the following array.  
10,14,126,23,26,33,44,48,50,55,60,66  
Make use of binary search method.
- 75 Using a two dimensional A[n x n], write a function to prepare one dimensional array Array[n<sup>2</sup>] that will have all the elements of A as if they were stored in Column major order.
- 76 Write a function to search for a given number in a given array ARR[n] using linear search technique. If the number is found, move it at the top of the array. If the number is not found, insert it at the end of the array.
77. Write a user defined function to sort the array (same as above) using insertion sort in descending order. Give the array status after each iteration
- 78 Write a user defined function to sort the array(same as above) using bubble sort in descending order. Give array status after each iteration
- 79 What would be the output of the following? Assume that the array starts at location 5714 in the memory?  
# include<iostream.h>  
void main()  
{

```

int tab[3][4]={ 5,6,7,8,
 1,2,3,4,
 9,10,0,11};
cout<<"\n"<<*tab[0]<<" "<<*(tab[0]+1);
cout<<"\n"<<*(tab+0)+1);
}

```

80 Write a user defined function to generate the pyramid from string arr("123456789").

```

1
2 3 2
3 4 5 4 3
4 5 6 7 5 6 4

```

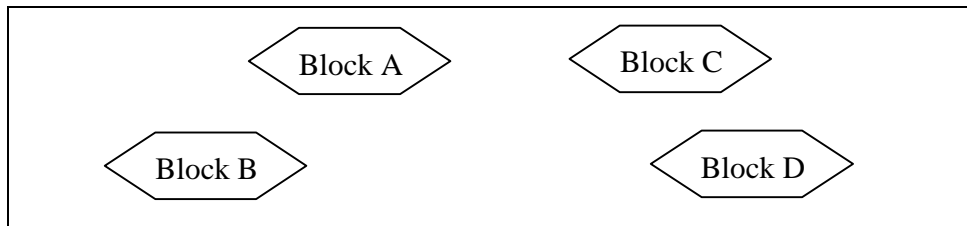
and so on.

### Networking and Communication

1 King Soft Organization has set up its new center at Mumbai for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below.



- a) Suggest a cable layout of connections between the blocks.
  - b) Suggest the most suitable place(i.e.block ) to house the server of this organization with a suitable reason.
  - c) Suggest the placement of the following devices with justification.
    - a. Repeater
    - b. Hub/Switch
  - d) The organization is planning to link its front office situated in the city in a
  - e) Hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed.
- 2 Knowledge supplement Organization has set up its new center at Mangalore for its office and web based activities. It has 4 Blocks of buildings as shown in the diagram below:



Center to center distance between various blocks

|                    |       |
|--------------------|-------|
| Block A to Block B | 50 m  |
| Block B to Block C | 150 m |
| Block C to Block D | 25 m  |
| Block A to Block D | 170 m |
| Block B to Block D | 125 m |
| Block A to Block C | 90 m  |

Number of Computers

|         |     |
|---------|-----|
| Block A | 25  |
| Block B | 50  |
| Block C | 125 |
| Block D | 10  |

- i. Suggest a most suitable cable layout of connections between the Blocks.
- ii. Suggest the most suitable places (i.e. Block) to house the server of this organization with a suitable reason.
- iii. Suggest the placement of the following devices with justification:
  - a. Repeater
  - b. Hub/Switch

The organization is planning to link its head office situated in City in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed?

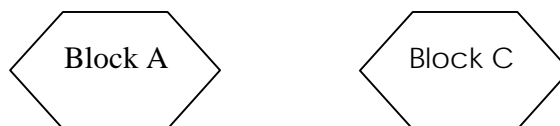
- 3 TKM Centenary public school in Kollam is setting up the network between its different wings. There are four wings named as Seniors (S), Kids (K), Juniors (J) and Hostel (H). Distance between various buildings is given below:

|             |      |
|-------------|------|
| Wing K to S | 100m |
| Wing K to J | 200m |
| Wing K to H | 400m |
| Wing S to J | 300m |
| Wing S to H | 100m |
| Wing J to H | 450m |

|        |               |
|--------|---------------|
| Wing K | 10 Computers  |
| Wing J | 100 Computers |
| Wing H | 50 Computers  |
| Wing S | 200 Computers |

- (i) Suggest a valid topology for networking the computer of all wings
- (ii) Name the wing where the server to be installed. Justify your answer.
- (iii) Suggest the placement of Hub or Switch in the network.
- (iv) Suggest a most suitable cable layout of connections between the wings.

- 3 JCT Industries has set up its new center at Chohal for its office and web based activities. The company compound has 4 blocks as shown in the diagram below:





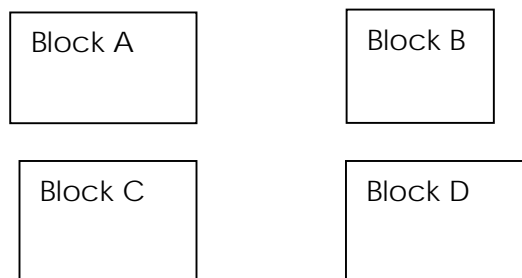
Center to center distances between various blocks is as follows:

|                    |       |
|--------------------|-------|
| Block A to Block B | 50 m  |
| Block B to Block C | 130 m |
| Block C to Block D | 70 m  |
| Block A to Block D | 180 m |
| Block B to Block D | 160 m |
| Block A to Block C | 80 m  |

Number of Computers in each of the blocks is as follows:

|         |     |
|---------|-----|
| Block A | 30  |
| Block B | 60  |
| Block C | 135 |
| Block D | 15  |

- 1) Suggest a cable layout of connections between the blocks.
  - 2) Suggest the most suitable place (i.e. block) to house the server of this company with a suitable reason.
  - 3) Suggest the placement of the following devices with justification:
    - (i) Repeater
    - (ii) Switch/Hub
  - 4) Mention the economic technology to provide internet accessibility to all blocks.
- 4 ABC Organization has set up its new center at Gurgaon for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below.



The distances between the building are as :

|                     |            |
|---------------------|------------|
| Block A to Block C- | 120 meters |
| Block A to Block B- | 20 meters  |
| Block A to Block D- | 550 meters |
| Block B to Block D- | 80 meters  |
| Block D to Block C- | 110 meters |

Block B to Block C- 280 meters

The number of computers in each Block are as follows:

- Block A - 120
- Block B - 180
- Block C - 20
- Block D - 110

- (i) Suggest a cable layout of connections between the blocks and type of cable.
- (ii) Suggest the most suitable place (i.e. block) to house the server of this organization with a suitable reason.
- (iii) Suggest the placement of the following devices with justification.
  1. Repeater
  2. Hub/Switch

The organization is planning to link its front office situated in the city in a Hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed.

- 5 Indian Industries has the following four buildings in Chennai. Distance between various wings is given below:



|                        |      |
|------------------------|------|
| Wing II 1 to Wing II 3 | 70m  |
| Wing II 1 to Wing II 2 | 20m  |
| Wing II 1 to Wing II 4 | 115m |
| Wing II 3 to Wing II 4 | 30m  |
| Wing II 2 to Wing II 3 | 25m  |

**Number of Computers**

|           |    |
|-----------|----|
| Wing II 1 | 35 |
| Wing II 2 | 25 |
| Wing II 3 | 80 |
| Wing II 4 | 60 |

- i. Suggest suitable CABLE LAYOUTS FOR THESE BUILDINGS.
- ii. Name the wing where the Server is to be installed. Justify your answer.
- iii. Suggest the placement of Hub/Switch in the network.
- iv. Mention an economic technology to provide Internet accessibility to all wings.

- 6 Hindustan Connecting World Association” is planning to start their offices in four major cities in India to provide regional IT infrastructure support in the field of Education & Culture. The company has planned to set up their head office in New Delhi in three locations and have named their New Delhi offices as “Sales Office”, “Head Office” and “Tech Office”. The company’s regional offices are located at “Coimbatore”, “Kolkata” and “Ahmedabad”.

A rough layout of the same is as follows:

Approximate distances between these offices as per network survey team is as follows:

| Place From  | Place To          | Distance |
|-------------|-------------------|----------|
| Head Office | Sales Office      | 10 KM    |
| Head Office | Tech Office       | 70 Meter |
| Head Office | Kolkata Office    | 1291 KM  |
| Head Office | Ahmedabad Office  | 790 KM   |
| Head Office | Coimbatore Office | 1952 KM  |

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

|                   |     |
|-------------------|-----|
| Head Office       | 100 |
| Sales Office      | 20  |
| Tech Office       | 50  |
| Kolkata Office    | 50  |
| Ahmedabad Office  | 50  |
| Coimbatore Office | 50  |

(i) Suggest network type (out of LAN, MAN, WAN) for connecting each of the following set of their offices:

- Head Office and Tech Office
- Head Office and Coimbatore Office

(ii) Which device will you suggest to be procured by the company for connecting all the computers within each of their offices out of the following devices?

- Modem
- Telephone
- Switch/ Hub

(iii) Which of the following communication media, will you suggest to be procured by the company for connecting their local offices in New Delhi for ver effective and fast communication?

- Ethernet Cable
- Optical Fiber
- Telephone Cable

(iv) Suggest a cable/ wiring layout for connecting the company’s local offices located in New Delhi. Also, suggest an effective method/ technology for connecting the company’s regional offices at “Kolkata”, “Coimbatore” and “Ahmedabad”.

## 6 Marks Questions

### SQL

1. Write SQL commands for (a) to (j) and write output for (h) on the basis of Teacher relation given below.

| No | Name     | Age | Department | Date of Join | Salary | Sex |
|----|----------|-----|------------|--------------|--------|-----|
| 1. | Jigal    | 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    | 27/02/97     | 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 teachers who are in Maths department
- c) To list names of all teachers with their date of joining in ascending order.
- d) To display students name, fee,age for male teacher only
- e) To count the number of teachers with age>23.
- f) To insert a new row in the TEACHER table with the following data:  
**9,"Raja",26,"Computer",13/05/95,2300,"M"**.
- g) To show all information about the teachers in this table
- h) Add a new column named "Address".
- i) Arrange the whole table in the alphabetical order to name
- j) Display the age of the teachers whose name starts with 'S,.
- k) Give the output of following statement.
  - (j) Select COUNT(distinct department) from TEACHER.
  - (ii) Select MAX(Age)from Teacher where sex='F'
  - (iii) Select AVG(Salary) from Teacher where Dateofjoin<12/07/96
  - (iv) Select SUM(Salary) from teacher where Dateofjoin<12/07/96

2. **TABLE : EMP**

| EMPNO | ENAME | JOB      | MGR | HIREDATE  | SAL   | COMM | DEPTNO |
|-------|-------|----------|-----|-----------|-------|------|--------|
| 7839  | REA   | MANAGER  | 67  | 12-DEC-98 | 5000  | 0    | 10     |
| 1234  | PREM  | CLERK    | 87  | 11-FEB-77 | 12000 | 1500 | 20     |
| 6754  | SITA  | MANAGER  | 89  | 12-MAR-99 | 10000 | 1000 | 20     |
| 6574  | GITA  | SALESMAN | 98  | 11-JUN-99 | 9000  | 0    | 30     |
| 9876  | HONEY | CLERK    | 65  | 12-JUN-00 | 12000 | 800  | 20     |
| 8976  | REEMA | SALESMAN | 91  | 10-SEP-88 | 6000  | 100  | 30     |

- (a) Display names of employees whose names include either of the substring "TH" or "LL".
- (b) Display data of all employees sorted by their department, seniority and salary.
- (c) Find all the employees who have no manager.
- (d) To display all employees who were hired during 1995.
- (e) Show the average salary for all departments with more than 3 people for a job.

- (f) Find out number of employees having 'MANAGER' as job.
- (g) Create view DEPT20 with name and the salary of employees for dept 20.
- (h) Display department no. and number of employees in each department.
- (i) Find the output of the following :
  1. SELECT SYSDATE FROM DUAL;
  2. SELECT ENAME,SAL FROM EMPLOYEE WHERE DEPTNO=20;
  3. SELECT COUNT(\*) FROM EMP;
  4. SELECT AVG(SAL) FROM EMP;

3. Consider the following WORKERS and DESIG. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii)

**WORKERS**

| W_ID | FIRSTNAME | LASTNAME | ADDRESS           | CITY         |
|------|-----------|----------|-------------------|--------------|
| 102  | Sam       | Tones    | 33 Elm St.        | Paris        |
| 105  | Sarah     | Ackerman | 440 U.S. 110      | New York     |
| 144  | Manila    | Sengupta | 24 Friends Street | New Delhi    |
| 210  | George    | Smith    | 83 First Street   | Howard       |
| 255  | Mary      | Jones    | 842 Vine Ave.     | Losantiville |
| 300  | Robert    | Samuel   | 9 Fifth Cross     | Wasington    |
| 335  | Henry     | Williams | 12Moore Street    | Boston       |
| 403  | Ronny     | Lee      | 121 Harrison St.  | New York     |
| 451  | Pat       | Thompson | 11 Red Road       | Paris        |

**DESIG**

| W_ID | SALARY | BENEFITS | DESIGNATION |
|------|--------|----------|-------------|
| 102  | 75000  | 15000    | Manager     |
| 105  | 85000  | 25000    | Director    |
| 144  | 70000  | 15000    | Manager     |
| 210  | 75000  | 12500    | Manager     |
| 255  | 50000  | 12000    | Clerk       |
| 300  | 45000  | 10000    | Clerk       |
| 335  | 40000  | 10000    | Clerk       |
| 400  | 32000  | 7500     | Salesman    |
| 451  | 28000  | 7500     | Salesman    |

- (i) To display W\_ID, FIRSTNAME, ADDRESS and CITY of all employees living in NEW YORK from the table WORKERS.
- (ii) To display the content of workers table in ascending order of LASTNAME.
- (iii) To display the FIRSTNAME, LASTNAME and total salary of all clerks from the tables WORKERS and DESIGN, where total salary is calculated as SALARY + BENEFITS.
- (iv) To display the minimum salary among Managers and Clerks from the table DESIG.
- (v) Give the output of following:
  - a. SELECT FIRSTNAME, SALARY FROM WORKERS, DESIG WHERE



- DESIGNATION = 'Manager' AND WORKERS.W\_ID = DESIG.W\_ID
- b. SELECT COUNT(DISTINCT DESIGNATION) FROM DESIG.
- c. SELECT DESIGNATION, SUM(SALARY FROM DESIGNATION GROUP BY DESIGNATION HAVING COUNT(\*)<3;  
SELECT SUM(BENEFITS) FROM WORKERS WHERE DESIGNATION = 'Salesman';

4. Write SQL commands for the statements (i) to (vi) on the basis of the table **EMPLOYEE**:

| Name         | EmpNo | DeptNo | Job       | Sal   | Comm |
|--------------|-------|--------|-----------|-------|------|
| G. Hussain   | 2098  | 10     | President | 7000  |      |
| Pallav       | 3099  | 30     | Manager   | 9000  | 1400 |
| Y.D. Sharma  | 8001  | 20     | Clerk     | 8500  |      |
| Bhawna       | 7901  | 10     | President | 4520  | 300  |
| A. Dasgupta  | 5400  | 20     | Analyst   | 6580  |      |
| P. Arora     | 3400  | 10     | Clerk     | 12000 |      |
| Col. Singhvi | 2100  | 30     | Manager   | 1200  | 500  |
| Amit         | 3100  | 30     | Analyst   | 3250  |      |
| A D'souza    | 2211  | 10     | Clerk     | 6900  |      |

- i. Show sum and average salary for marketing deptt.
- ii. Check all employees have unique names.
- iii. Find all employees whose deptt is same as of 'Amit'.
- iv. Increase the salary of all employees by 10%.
- v. Find the deptt that is paying max salaries to its employees.
- vi. Display the details of all the employees having salary less than 10000.
5. Write the SQL commands for (a) to (d) and write the output for (e) on the basis of table **Hospital** :

| No | Name     | Age | Department | Dateofadmin | Charge | Sex |
|----|----------|-----|------------|-------------|--------|-----|
| 1  | Arpit    | 62  | Surgery    | 21/01/06    | 300    | M   |
| 2  | Zayana   | 18  | ENT        | 12/12/05    | 250    | F   |
| 3  | Kareem   | 22  | Orthopedic | 19/02/06    | 450    | M   |
| 4  | Abhilash | 26  | Surgery    | 24/11/06    | 300    | M   |
| 5  | Dhanya   | 24  | ENT        | 20/10/06    | 350    | F   |
| 6  | Siju     | 23  | Cardiology | 10/10/06    | 800    | M   |
| 7  | Ankita   | 16  | ENT        | 13/04/06    | 100    | F   |
| 8  | Divya    | 15  | Cardiology | 10/11/06    | 500    | F   |
| 9  | Nidhin   | 25  | Orthopedic | 12/05/06    | 700    | M   |
| 10 | Hari     | 28  | Surgery    | 19/03/06    | 450    | M   |

- (a) To show all information about the patients of cardiology department.
- (b) To list the name of female patients who are in ENT department.
- (c) To list names of all patients with their date of admission in ascending order.
- (d) To count the no of patients with age > 20.
- (e) Give the output of the following SQL commands:
- (i) Select COUNT(DISTINCT charges ) from hospital;

- (ii) Select MIN(age) from hospital where Sex='M';
- (iii) Select SUM(charges) from hospital where Sex = 'F';
- (iv) Select avg(charges) from hospital where dateofadm > { 12/05/06};

6. Write the SQL commands for the following on the basis of tables INTERIORS and NEWONES

Table: INTERIORS

| SNO | ITEMNAME      | TYPE         | DATEOFSTOCK | PRICE | DISCOUNT |
|-----|---------------|--------------|-------------|-------|----------|
| 1   | Red Rose      | Double Bed   | 23/02/02    | 32000 | 15       |
| 2   | Soft Touch    | Baby Cot     | 20/1//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

| SNO | ITEMNAME   | TYPE       | DATEOFSTOCK | PRICE | DISCOUNT |
|-----|------------|------------|-------------|-------|----------|
| 11  | White Wood | Double Bed | 23/02/02    | 20000 | 20       |
| 12  | James 007  | Sofa       | 20/02/03    | 15000 | 15       |
| 13  | Tom Look   | Baby Cot   | 21/02/03    | 7000  | 10       |

- (i) To list the ITEMNAME which are priced at more than 1000 from the INTERIORS table
  - (ii) To list ITEMNAME and TYPE of those items, in which DATEOFSTOCK is before 22/01/02 from the INTERIORS table in descending order of ITEMNAME
  - (iii) To show all information about the sofas from the INTERIORS table
  - (iv) To display ITEMNAME and DATEOF STOCK of those items in which the discount percentage is more than 15 from INTERIORS table
  - (v) To count the number of items, whose type is "Double Bed" from INTERIORS table
  - (vi) To insert a new row in the NEWONES table with the following data  
14,"True Indian", "Office Table", 28/03/03,15000,20
- c) Get the Output (Use the above table without inserting the record)  
 Select COUNT(distinct TYPE) from INTERIORS  
 Select AVE(DISCOUNT) from INTERIORS where TYPE="Baby Cot"  
 Select SUM(Price) from INTERIORS where DATEOF STOCK < { 12/02/02 }  
 Select MAX(Price) from INTERIORS , NEWONES;

7. Given the following tables for a database FURNITURE : Note: Write SQL command for (a) to (d) and write the outputs for (e) on the basis 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 teather    | 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   | 21/02/03    | 7500  | 15         |

- (a). To list the ITEMNAME which are priced at more than 15000 from the FURNITURE table.
- (b) 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.
- (c) To display ITEMNAME and DATEOFSTOCK of those items, in which the DISCOUNT percentage is more than 25 from FURNITURE table.
- (d) To count the number of items, whose TYPE is 'Sofa' from FURNITURE table.
- (e) 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) 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}

8. Given the following **LAB** table, write SQL command for the questions (i) to (iii) and give the output of (iv).

**LAB**

| No | ItemName | CostPerItem | Quantity | Dateofpurchase | Warranty | Operational |
|----|----------|-------------|----------|----------------|----------|-------------|
| 1  | Computer | 60000       | 9        | 21/5/96        | 2        | 7           |
| 2  | Printer  | 15000       | 3        | 21/5/97        | 4        | 2           |
| 3  | Scanner  | 18000       | 1        | 29/8/98        | 3        | 1           |
| 4  | Camera   | 21000       | 2        | 13/10/96       | 1        | 1           |
| 5  | Switch   | 8000        | 1        | 31/10/99       | 2        | 1           |
| 6  | UPS      | 5000        | 5        | 21/5/96        | 1        | 4           |
| 7  | Router   | 25000       | 2        | 11/1/2000      | 2        | 5           |

- (i) To select the ItemName, which are within the Warranty period till present date.
- (ii) To display all the itemName whose name starts with "C".
- (iii) To list the ItemName in ascending order of the date of purchase Where quantity is more than 3.
- (iv) Give the output of the following SQL commands:
  - (a) select min(DISTINCT Quantity) from LAB;
  - (b) select max(Warranty) from LAB;
  - (c) select sum(CostPerItem) from Lab;

9. **Table : SchoolBus**

| Rtno | Area_oved     | Capacity | No of students | Distance | Transporter   | Charges |
|------|---------------|----------|----------------|----------|---------------|---------|
| 1    | Vasant kunj   | 100      | 120            | 10       | Shivamtravels | 100000  |
| 2    | Hauz Khas     | 80       | 80             | 10       | Anand travels | 85000   |
| 3    | Pitampura     | 60       | 55             | 30       | Anand travels | 60000   |
| 4    | Rohini        | 100      | 90             | 35       | Anand travels | 100000  |
| 5    | Yamuna Vihar  | 50       | 60             | 20       | Bhalla Co.    | 55000   |
| 6    | Krishna Nagar | 70       | 80             | 30       | Yadav Co.     | 80000   |
| 7    | Vasundhara    | 100      | 110            | 20       | Yadav Co.     | 100000  |
| 8    | Paschim Vihar | 40       | 40             | 20       | Speed travels | 55000   |
| 9    | Saket         | 120      | 120            | 10       | Speed travels | 100000  |
| 10   | Jank Puri     | 100      | 100            | 20       | Kisan Tours   | 95000   |

- (a) To show all information of students where capacity is more than the no of student in order of rtno.
- (b) To show area\_covered for buses covering more than 20 km., but charges less than 80000.
- (c) To show transporter wise total no. of students traveling.
- (d) To show rtno, area\_covered and average cost per student for all routes where average cost per student is - charges/noofstudents.
- (e) Add a new record with following data:  
(11, "Moti bagh", 35, 32, 10, "kisan tours", 35000)
- (f) Give the output considering the original relation as given:
  - (i) select sum(distance) from schoolbus where transporter= "Yadav travels";
  - (ii) select min(noofstudents) from schoolbus;
  - (iii) select avg(charges) from schoolbus where transporter= "Anand travels";
- (v) select distinct transporter from schoolbus;
- (vi)

10 **TABLE : GRADUATE**

| S.NO | NAME    | STIPEND | SUBJECT   | AVERAGE | DIV. |
|------|---------|---------|-----------|---------|------|
| 1    | KARAN   | 400     | PHYSICS   | 68      | I    |
| 2    | DIWAKAR | 450     | COMP. Sc. | 68      | I    |
| 3    | DIVYA   | 300     | CHEMISTRY | 62      | I    |
| 4    | REKHA   | 350     | PHYSICS   | 63      | I    |
| 5    | ARJUN   | 500     | MATHS     | 70      | I    |
| 6    | SABINA  | 400     | CEHMISTRY | 55      | II   |
| 7    | JOHN    | 250     | PHYSICS   | 64      | I    |
| 8    | ROBERT  | 450     | MATHS     | 68      | I    |
| 9    | RUBINA  | 500     | COMP. Sc. | 62      | I    |
| 10   | VIKAS   | 400     | MATHS     | 57      | II   |

- (a) List the names of those students who have obtained DIV 1 sorted by NAME.
- (b) Display a report, listing NAME, STIPEND, SUBJECT and amount of stipend received in a year assuming that the STIPEND is paid every month.
- (c) To count the number of students who are either PHYSICS or COMPUTER SC graduates.
- (d) To insert a new row in the GRADUATE table:  
11,"KAJOL", 300, "computer sc", 75, 1
- (e) 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 SUBDJECT) from GRADUATE;

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  |

- g) What will be the output of the following query:  
SELECT NAME, ADVISOR FROM GRADUATE, GUIDE WHERE SUBJECT=MAINAREA;

11. Write SQL command for (a) to (g) on the basis of the table SPORTS

| Student NO | Class | Name    | Game1      | Grade | Game2      | Grade2 |
|------------|-------|---------|------------|-------|------------|--------|
| 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     | Cricket    | A      |
| 15         | 10    | Arpit   | Cricket    | A     | Atheletics | C      |

- Display the names of the students who have grade 'C' in either Game1 or Game2 or both.
- Display the number of students getting grade 'A' in Cricket.
- Display the names of the students who have same game for both Game1 and Game2.
- Display the games taken up by the students, whose name starts with 'A'.
- Assign a value 200 for Marks for all those who are getting grade 'B' or grade 'A' in both Game1 and Game2.
- Arrange the whole table in the alphabetical order of Name.
- Add a new column named 'Marks'.

12.

**Employees**

| Empid | Firstname | Lastname | Address           | City       |
|-------|-----------|----------|-------------------|------------|
| 010   | Ravi      | Kumar    | Raj nagar         | GZB        |
| 105   | Harry     | Waltor   | Gandhi nagar      | GZB        |
| 152   | Sam       | Tones    | 33 Elm St.        | Paris      |
| 215   | Sarah     | Ackerman | 440 U.S. 110      | Upton      |
| 244   | Manila    | Sengupta | 24 Friends street | New Delhi  |
| 300   | Robert    | Samuel   | 9 Fifth Cross     | Washington |
| 335   | Ritu      | Tondon   | Shastri Nagar     | GZB        |
| 400   | Rachel    | Lee      | 121 Harrison St.  | New York   |
| 441   | Peter     | Thompson | 11 Red Road       | Paris      |

**EmpSalary**

| Empid | Salary | Benefits | Designation |
|-------|--------|----------|-------------|
| 010   | 75000  | 15000    | Manager     |
| 105   | 65000  | 15000    | Manager     |
| 152   | 80000  | 25000    | Director    |
| 215   | 75000  | 12500    | Manager     |
| 244   | 50000  | 12000    | Clerk       |
| 300   | 45000  | 10000    | Clerk       |
| 335   | 40000  | 10000    | Clerk       |
| 400   | 32000  | 7500     | Salesman    |
| 441   | 28000  | 7500     | salesman    |

Write the SQL commands for the following :

- (i) To show firstname,lastname,address and city of all employees living in paris
- (ii) To display the content of Employees table in descending order of Firstname.
- (iii) To display the firstname,lastname and total salary of all managers from the tables Employee and empsalary , where total salary is calculated as salary+benefits.
- (iv) To display the maximum salary among managers and clerks from the table Empsalary.
- (v) Give the Output of following SQL commands:
  - (i) Select firstname,salary from employees ,empsalary where designation = 'Salesman' and Employees.empid=Empsalary.empid;
  - (ii) Select count(distinct designation) from empsalary;
  - (iii) Select designation, sum(salary) from empsalary group by designation having count(\*) >2;
  - (iv) Select sum(benefits) from empsalary where designation ='Clerk';

13 Write SQL commands for the following taking in view the following table as SCHOOL:

| No. | Name     | Age | Department | Sex |
|-----|----------|-----|------------|-----|
| 1   | Ankit    | 45  | Comp.Sc.   | M   |
| 2   | Sumit    | 32  | History    | M   |
| 3   | Amit     | 22  | Geog       | M   |
| 4   | Suchitra | 23  | Maths      | F   |
| 5   | Ankita   | 22  | Hindi      | F   |
| 6   | Shruti   | 21  | Comp.Sc.   | F   |
| 7   | Raksha   | 22  | Hindi      | F   |
| 8   | Priya    | 33  | Maths      | F   |

- b. To show all information about the members of the Hindi Department.
- c. To list the names of female members who are in Hindi department.
- d. To list names of all members with the ascending order of their ages.
- e. To display member's name, age and department name of males.
- f. To count the number of members with age >21.
- g. To insert a new row in the SCHOOL table with the following data :  
9, "Pinto",31,"Maths","M"
- h. Give the output of the following, considering the above table :
  - a. SELECT COUNT (DISTINCT AGE) FROM SCHOOL;
  - b. SELECT MAX(AGE) FROM SCHOOL WHERE SEX = "M";
  - c. SELECT AVG(AGE) FROM SCHOOL WHERE SEX ="M";
  - d. SELECT SUM(AGE) FROM SCHOOL WHERE SEX="M";

14. Write SQL command for (a) to (g) on the basis of the table GAMES

**Table: GAMES**

| GCode | Game Name    | Number | PrizeMoney | ScheduleDate |
|-------|--------------|--------|------------|--------------|
| 101   | Carom Board  | 2      | 5000       | 23-Jan-2004  |
| 102   | Badminton    | 2      | 12000      | 12-Dec-2003  |
| 103   | Table Tennis | 4      | 8000       | 14-Feb-2004  |
| 105   | Chess        | 2      | 9000       | 01-Jan-2004  |
| 108   | Lawn Tennis  | 4      | 25000      | 19-Mar-2004  |

**Table: PLAYER**

| Pcode | Name       | GCode |
|-------|------------|-------|
| 1     | Nabi Ahmed | 101   |
| 2     | Ravi Sahai | 108   |
| 3     | Jatin      | 101   |
| 4     | Nazneen    | 103   |

- (a) To Display the details of all games with their codes.
- (b) To display details of those games which are having PrizeMoney more than 7000.
- (c) To display the content of GAMES table in ascending order of ScheduleDate.
- (d) TO Display sum of PrizeMoney for each of the number of participation grouping (as shown in column number 3.
- (e) SELECT COUNT (DISTINCT Number) FROM GAMES;
- (f) SELECT MAX (ScheduleDate), MIN (ScheduleDate) FROM GAMES;
- (g) SELEC SUM (PrizeMoney) FROM GAMES;
- (h) SELECT DISTINCE Gcode FROM PLAYER;