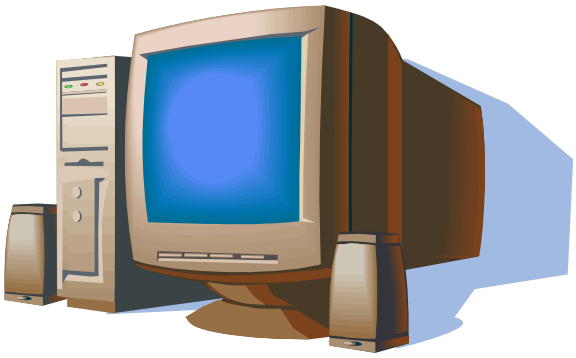
Class XII

Computer Science



CHAPTER WISE
HOTS (High Order Thinking Skill)

QUESTIONS WITH ANSWER
BASED
ON
CBSE PATTERN

Prepared by: PGTs (Computer Science)

1. REVISION TOUR C++, POINTERS – Mrs. Vaishali, KV No.1 Delhi Cantt.
2. Classes & Objects, Constructor and Destructor, Inheritance, Mr. Pradeep, KV Chawla
3. Data Structure – Link List, Stacks and Queues, Narsi Lal, KV AGCR
4. Data File handling in c++ - Ms Manpreet Kaur, KV Andrewsganj
5. DBMS & SQL – Mr. Ashok, KV Bawana
6. Boolean Algebra – Harleen Kaur, KV VigyanVihar
7. Communication and Network Concepts – Sanjay Kumar Nama, KV JNU

WHERE IS WHAT?

Question 1. REVISION TOUR C++, OOPs Concepts & POINTERS

Q 1 WHAT WIIL BE OUTPUT OF FOLLOWING PROGRAM? 1

```
#include<iostream.h>
# include <conio.h>
void main()
{
clrscr();
int sum(int(*)(int),int);
int square(int);
int cube(int);
cout<<sum(square,4)<<endl;
cout<<sum(cube,4)<<endl;
getch();
}
int sum(int(*ptr)(int k),int n)
{
int s=0;
for(int i=1;i<=n;i++)
      {
      s+=(*ptr)(i);
      }
      return s;
}
int square(int k)
{ int sq;
sq=k*k;
return k*k;
}
int cube(int k)
{
return k*k*k;
}
```

ANS 1> OUTPUT WILL BE

30
100

Q2>How many times will the following program will print “examination”? 1

```
#include<iostream.h>
void main( )
{
      while(1)
      {
            cout<<"examination"
      }
}
```

ANS 2>Unless ^C is pressed ,program will print “examination” infinitely.

Q 3> Will the following programs produce same output? 2

Program 1

```
# include<iostream.h>
# include<conio.h>
void main()
{
int x,y=1;
if((x=y)!=0)
cout<<x<<" "<<y;
getch();
}
```

Program 2

```
# include<iostream.h>
# include <conio.h>
void main()
{
int x,y=0;
if((x=y=1)==1)
cout<<x<<" "<<y;
getch();
}
```

Q4>What woulg\d be contents of following after array initialization? 1

int A[5]={3,8 ,9}

Ans 4>

A

3	8	9	0	0

Q5>Suggest storage class for following variables ½ each

1. a normal variable.
2. very heavily used variable.
3. a variable that should retain its value after function is over.
4. a variable that spanes multiple files.
5. a variable global in one & not available in another file.

Ans 5>

1. auto
2. register
3. static
4. extern
5. static global

Q 6> "Pointers always contain integers " Comment. 1

Ans 6>

Pointer variable always store address of a variable which is always an integer.
So pointers always store integers.

Classes & Objects, Constructor and Destructor, Inheritance

Q.1 What is the difference between the constructor and normal function?
Ans.

Constructor	Normal Function
1. Constructor has same name as class name.	1. A normal function can have any legal name but not class name.
2. Constructor can not have any return type value not even void.	2. A function should have any return type value.
3. Constructor is automatically called.	3. A function is explicitly called.
4. Constructor can not be static.	4. A Function can be static.

Q.2 What is the similarity between class and the constructor? (HOTS)/Bright Student
Ans.: The only similarity between constructor and is that constructor has same name as class name.

Q.3 Find the output of the following program?

```
#include<iostream.h>
#include<conio.h>
#include<string.h>
class state
{ char *statename;
  int size;
  public:
  state(){size=0;statename=new char[size+1];}
  state (char *s)
  { size=strlen(s);statename=new char[size+1];
    strcpy(statename,s);
  }
  void display()
  { cout<<statename<<endl;}
  void replace(state&a, state &b)
  {size=a.size+b.size;
   delete statename;
   statename=new char[size+1];
   strcpy(statename, a.statename);
   strcat(statename,b.statename);
  }
};
void main()
{ clrscr();
  char *temp="Delhi";
  state state1(temp), state2("Mumbai"), state3("Nagpur"), s1,s2;
  s1.replace(state1,state2);
  s2.replace(s1,state3);
  s1.display();
  s2.display();
  getch();
}
```

Ans.: DelhiMumbai
DelhiMumbaiNagpur

Q.3 Find out errors in the following program:-

```
class number
{
      int x=10;
      float y;
      number(){ x=y=10;}
public:
      number(number t)
      {
            x=t.x; y=t.y;
      }
      ~ (){ cout<<"Object destroyed ";}
}
main()
{
      number a1, a2(a1);
}
```

Ans.: error: int x=10; // class member can not be initialized in the class.
Constructor should be declared in public section of class.
Reference operator is missing in the definition of copy constructor
In destructor class name is missing.
Semicolon is missed after the definition of class.

Q.4 What is the difference between nesting or containership and inheritance? Explain with example?
Ans.: Containership or Nesting: When a class contains object of other class type as its data member is known as containership or nesting.

Inheritance: Inheritance is the process of creating new class by reusing the properties of an existing class by accessing them depending on different visibility mode. The new class is called derived and existing class is called base class.

Q.5 What will be the output of the program?

```
#include<iostream.h>
class base
{ public:
      void display()
      {
            cout<<"It is a base class "<<endl;
      }
};
class derived: public base
{
      public:
            void display()
            { cout<<"It is a derived class "<<endl;}
            };
      main()
      {
            derived ob1;
            ob1.display();
}
```

Ans:- The output will be:

It is a derived class.

Q.6 Define a class named Tour in C++ with following description? 4

Private members:

tcode	integer (Ranges 6 - 10)
adults, children, distance	integer
totalfare	float
AssignFare( )	A function which calculates and assign the value to data member totalfare as follows:-

- **For adults**

Fare	Distance
Rs. 500	>=1500

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

- **For Children**

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

Public members:

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

Ans.

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

Q.7. Define a class named Admission in C++ with following description? 4

Private members:

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

Public members:

A constructor which initialized admno with 10, name with "NULL", cls with 0 & fees with 0
Function getdata() to read the object of Admission type.
Function putdata() to print the details of object of admission type.
Function draw_nos() to generate the admission no. randomly to match with admno and display the detail of object.

Ans.:

```
class admission
{     int admno;
      char name[20];
      int cls;
      float fees;
  public:
      admission()
{     admno=10;
      strcpy(name,"NULL");
      cls=0;
      fees=0;
}
void getdata()
{
      do
      {     cout<<"Enter admno between 10-1500 ";
            cin>>admn
            if (admno<10 || admno>1500)
                  cout<<"Invalid admission no !"<<endl;
      }while(admno<10 ||admno>1500);
      cout<<"Enter name ";
      gets(name);
      cout<<"Enter class and fees ";
      cin>>cls>>fees;
}
void putdata()
{     cout<<"Admno :"<<admno<<endl;
      cout<<"Name  :"<<name<<endl;
      cout<<"Class :"<<cls<<endl;
      cout<<"Fees  :"<<fees<<endl;
}
void draw_nos()
{     int num;
      randomize();
      num=random(1491)+10;
      if (num==admno)
            putdata();
}
};
```

Q.8

```
Class testmeout
{     int rollno;
      public:
      ~testmeout()     //Function 1
      {     cout<<rollno<<" is Leaving examination hall"<<endl;
      }
      testmeout()      //Function 2
      {     rollno=1;
            cout<<rollno<<" is appearing for examination "<<endl;
      }
      testmeout(int n, char name[])    //Function 3
      {     rollno=n;
            cout<<name<<" is in examination hall"<<endl;
      }
      testmeout(testmeout & t);//function 4
      void mywork()    //Function 5
      {     cout<<rollno<<" is attempting questions "<<endl;
      }
};
```

i) In object oriented programming, what is Function 1 referred as and when does it get invoked?
ii) In object oriented programming, what is Function 2 referred as and when does it get invoked?
iii) In object oriented programming, what is Function 3 referred as and when does it get invoked?
iv) Write a statement so that function 3 gets executed?
Complete the definition of function 4
v) What will be the output of the above code if its main function definition is as given below (assumed the definition of Function 4 is completed) :

```
main()
{testmeout ob1;
 ob1.mywork();
}
```

vi) Which feature of object oriented programming is demonstrated using Function 2, Function 3 and Function 4 in the above class testmeout?
vii) What is the scope of data member (rollno) of class testmeout? What does the scope of data members depend upon?
Ans:-
i) It is referred as destructor. It is automatically invoked when an object of concerned class goes out of scope.
ii) It is referred as constructor. It is automatically invoked when an object of concerned class is declared / created.
iii) It is parameterized constructor and gets invoked when an object of concerned class is created / declared with the matched parameters.
iv) testmeout ob1(15, "Vicky");
testmeout (testmeout & t) { rollno=t.rollno;}
v) output will be :
1 is appearing for examination
1 is attempting questions
1 is Leaving examination hall
vi) It is constructor overloading. It shows Polymorphism feature of the OOP.
vii) The rollno member of object can only be used by the concerned object where that object is declared. Its scope basically depends upon the concerned object.

Data Structure – Array, link List, Stack & Queue

Q. 1 Given two arrays of integers A and B of sizes M and N respectively. Write a function named MIX() which will produce a third array named C, such that the following sequence is followed :

All even numbers of A from left to right are copied into C from left to right.
All odd numbers of A from left to right are copied into C from right to left
All even numbers of B from left to right are copied into C from left to right.
All odd numbers of B from left to right are copied into C from right to left
A, B and C are passed as arguments to MIX().

e.g. : A is {3,2,1,7,6,3} and B is {9,3,5,6,2,8,10}, the resultant array C is {2,6,6,2,8,10,5,3,9,3,7,1,3}

Solution :

```
void mix (int A[], int B[], int n, int m)
{    int c[20],i=0,j=0,k=0,l;
     L=m+n-1;
     while (i<n && k<20)
     {    if (A[i]%2==0)
               C[k++] = A[i++];
          else  C[l--] = A[i++];
     }
     While (j<m && k<20)
     {   if (B[j]%2==0)
          C[k++]=B[j++];
         else              C[l--]=B[j++];
     }
     cout<<" \nThe elements of an array C is :";
     for (i=0;i<m+n;i++)
          cout<<"\n"<<C[i];
}
void main()
{    int A[j= { 3,2,1,7,6,3}, B[]= {9,3,5,6,2,8,10};
     Mix(A,B,6,7);
}
```

Q. 2. Suppose an array P containing float is arranged in ascending order. Write a user defined function in C++ to search for one float from P with the help of binary search method. The function should return an integer 0 to show absence of the number and integer 1 ti show presence of the number in the array. The function should have the parameters as (1) an array (2) the number DATA to be searched (3) number of element N.

Solution :

```
int bsearch (float P[10], float DATA, int N)
{   int beg =0, end = N-1,mid, pos = -1;
     while(beg<=end)
      {   mid = ( beg+ end )/2;
          if (P[mid] == DATA)
          {    pos =mid +1;
               Break;
          }
          else if (item > AE[mid] )
               beg = mid +1;
          else
               end = mid-1;
     }
     return ((pos==-1)? 0:1);
}
```

Q. 3 Write a function in C++ which accepts an integer array and its size as arguments / 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

The resultant 2D array is given below

```
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
```

If the array is 1,2,3

The resultant 2D array is given below

```
1 2 3
1 2 0
1 0 0
```

Solution :

```
void func(int arr[], int size)
{     int a2[20][20], i, j;
      for (i=0;i<size; i++)
      {        for (j=0;j<size;j++)
            {   if ((i+j) >=size)
                  a2[i][j]=0;
                  else      a2[i][j]= arr[j];
                  cout<<a2[i][j]<<" ";
            }
      Cout<<"\n";
      }
}
```

Q-4 Write a function in C++ to perform a PUSH operations on a dynamically allocated stack containing real number?

Ans-

```
struct Node
{
      float data;
      Node * next;
};
Void push (Node*Top, float num)
{
      Node*nptr = new Node;
      nptr -> data = num;
      nptr -> next = NULL;
      if(Top == NULL)
            Top = nptr;
      else
      {
            nptr -> next = Top;
            Top = nptr;
      }
}
```

Q-5 Each node of a STACK containing the following information, in addition to required pointer field:
Roll no. of the student
Age of the student.
Gve the structure of node for the linked stack in question.
TOP is a pointer to the topmost node of the STACK. Write the following function:
PUSH() – TO push a node in to the stack which is allocated dynamically.
POP() – Te remove a node from the stack and to release the memory.
Ans-

```
struct STACK
{
      int rollno, age;
            STACK*next;
} *top, *nptr, *ptr;
 void pop()
{
      if (!pop)  {    cout << "\nUnderflow!!" ;  exit(1);        }
      else
      {    cout << '\n' << top -> rollno << '\t' << top -> age;
            ptr = top;
            top = top -> next;
            delete ptr;
      }
}
Void push()
{
      nptr = new stack;                //allocate memory
      cout << "\n Enter roll number and age to be inserted : " ;
      cin >> nptr-> rollno >> nptr->age ;
      nptr -> next = NULL;
      if (!top)  top = nptr;
      else
      {
            ptr -> next = top;
            top = nptr
      }
}
```

Q.6 Write a function MAX in C++ which will return the Largest number stored in a two dimensional array of Integers.
Ans

```
#include <iostream.h>
#include <conio.h>
const r = 100, c = 100;
// Function to find the largest integer in a two-dimensional array
int MAX(int a[r][c], int m, int n)
{
      int max = 0;
      for(int i= 0;i<m;i++)
            for(int j= 0;j<n;j++)
            {
```

```
                if (a[i][j] >max)
                     max = a[i][j];
          }
     return max;
}
void main()
{
     clrscr();
     int ar[r][c];
     int rr, cc, mx = 0;
     int i, j;
     cout << "Enter no. of row : ";
     cin >> rr;
     cout << "Enter no. of column : ";
     cin >> cc;
     cout << "Enter the array elements : ";
     for (i=0; i<rr; i++)
          for (j = 0; j<cc; j++)
               cin >> ar[i][j];
     mx = MAX(ar, rr, cc);
     cout << "Largest element is : " << max;
}
```

Q.7 Write a function in c++ which accepts a 2D array of integers and its size as arguments and displays the elements which lies on diagonals.
[Assuming the2D array to be a square matrix with odd dimensions , i.e 3x3, 5x5,7x7, etc]

Example if the array content is
5 4 3
6 7 8
1 2 9
Output through the function should be
Diagonal one : 5 7 9
Diagonal two : 3 7 1 .

Ans

// Function to display the elements which lie on diagonals

```
#include <stdio.h>
#include <iostream.h>
#include <conio.h>
const  M = 10;
const  N = 10;
void display_diagonals(int MATRIX[M][N], int r, int c)
{
     clrscr();
     // Finding the diagonal from left index to right
     cout << "Diagonal One : ";
     for(int i=0; i<r; i++)
          for(int j=0; j<c; j++)
```

```
            {
                  cout <<  MATRIX[i][j] << "  ";
                  i++;
            }
      cout << endl;
      // Finding the diagonal from right index to left
      cout << "Diagonal Two : ";
      for(i=0; i<=r; i++)
      {
            for(int j=c-1; j>=0; j--)
            {
                  cout << MATRIX[i][j] << "  ";
                  i++;
            }
      }
      getch();
}
void main()
{
      int MATRIX[M][N];
      int i, j;
      int r, c;
      cout << "Enter total no. of rows: ";
      cin >> r;
      cout << "Enter total no. of columns: ";
      cin >> c;
      if ((r == c) && ((r%2==1) && (c%2==1)))
      {
            cout << "Input steps";
            cout << "\n\Enter the element in the array\n";
            for(i=0; i<r; i++)
                  for(j=0; j<c; j++)
                  {
                        cin >> MATRIX[i][j];
                  }
      }
      else
            return;
      display_diagonals(MATRIX, r, c);
}
```

Q.8 Write a function in C++ which accepts a 2D array of integers and its size as arguments and displays the elements of the middle row and the elements of middle column.

Example if the array content is

3 5 4
7 6 9
2 1 8

Output through the function should be:

Middle row: 769 Middle column: 5 6 1

Ans

```
// Function to display the elements which lie on middle of row and column
#include <stdio.h>
#include <iostream.h>
#include <conio.h>
const  M = 10;
const  N = 10;
void display_RowCol(int Array[M][N], int r, int c)
{     int row = r / 2;
      int col = c / 2;
      // Finding the middle row
      cout << "Middle Row : ";
      for(int j=0; j<c; j++)
            cout << Array[row][j] << "  ";
      cout << endl;
      // Finding the middle column
      cout << "Middle Column : ";
      for(j=0; j<c; j++)
            cout << Array[j][col] << "  ";
      getch();
}
void main()
{     int Array[M][N];
      int i, j;
      int r, c;
      cout << "Enter total no. of rows: ";
      cin >> r;
      cout << "Enter total no. of columns: ";
      cin >> c;
      if ((r == c) && ((r%2==1) && (c%2==1)))
      {     cout << "Input steps";
            cout << "\n\Enter the element in the array\n";
            for(i=0; i<r; i++)
                  for(j=0; j<c; j++)
                  {     cin >> Array[i][j];         }
      }
      else
      {     cout << "Input row and column not valid";
            getch();
            return;
      }
      display_RowCol(Array, r, c);
}
```

Q. 9. Declare a stack using array that contains int type numbers and define pop and push function using C++ Syntax.

Ans

```
#include <iostream.h>
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
#include <ctype.h>
#define MAX 100 // Shows maximum array length
int stack[MAX];       // Declares array global variable
int top;              // Declares integer top
// Function prototypes of add stack, delete stack, and
// show stack in array implementation
void push(int stack[], int val, int &top); // Add stack
int pop(int stack[], int &top); // Delete stack
void show_Stack(int stack[], int top); // Show stack
void main()
{
      int choice, val;
      char opt = 'Y';       // To continue the do loop in case
      top = -1;  // Initialization of Queue
      clrscr();
      do
      {
            cout << "\n\t\t Main Menu";
            cout << "\n\t1. Addition of Stack";
            cout << "\n\t2. Deletion from Stack";
            cout << "\n\t3. Traverse of Stack";
            cout << "\n\t4. Exit from Menu";
            cout << "\n\nEnter your choice from above -> ";
            cin >> choice;
            switch (choice)
            {
               case 1:
                  do
                  {     cout << "Enter the value to be added in the stack ";
                        cin >> val;
                        push(stack, val, top);
                        cout <<"\nDo you want to add more elements <Y/N> ? ";
                        cin >> opt;
                  } while (toupper(opt) == 'Y');
                  break;
               case 2:
                  opt = 'Y'; // Initialize for the second loop
                  do
                  {     val = pop(stack, top);
                        if (val != -1)
                        cout << "Value deleted from statck is " << val;
                        cout <<"\nDo you want to delete more elements<Y/N>?";
                        cin >> opt;
                  } while (toupper(opt) == 'Y');
```

```
                  break;
               case 3:
                  show_Stack(stack, top);
                  break;
               case 4:
                  exit(0);
            }
      }
      while (choice != 4);
}
// Function body for add stack with array
void push(int stack[], int val, int &top)
{
      if (top == MAX - 1)
      {     cout << "Stack Full ";
      }
      else
      {     top = top + 1;
            stack[top] = val;
      }
 }
// Function body for delete stack with array
int pop(int stack[], int &top)
{
      int value;
      if (top < 0)
      {     cout << "Stack Empty ";
            value = -1;
      }
      else
      {     value = stack[top];
            top = top - 1;
      }
      return (value);
}
// Function body for show stack with array
void show_Stack(int stack[], int top)
{
      int i;
      if (top < 0)
      {     cout << "Stack Empty";
            return;
      }
      i = top;
      clrscr();
      cout << "The values are ";
      do
      {     cout << "\n" << stack[i];
            i  = i - 1;
      }while(i >= 0);
}
```

Q.10. Define functionstackpush( ) to insert nodes and stack pops ( ) 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 stuck {
    Node * top ;
    Public
       Stack ( ) { top = null ;} ;
        Void stackpush ( );
        Void stack pop ( ) ;
}
```

Ans

```
#include <iostream.h>
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
#include <ctype.h>
// Declares a stack structure
struct node
{
     char name[20];
     int age;
     node *link;
};
class stack
{
     node *top;
     public :
     stack() { top = NULL; }
     void stackpush(); // Add stack
     void stackpop(); // Delete stack
     void show_Stack(); // Show stack
};
// Function body for adds stack elements
void stack::stackpush()
{
     int val;
     node *temp;
     temp = new node;
     cout << "Enter name : ";
     gets(temp->name);
     cout << "Enter age : ";
     cin >> temp->age;
     temp->link = NULL;
     if(top ==NULL)
          top = temp;
```

```
      else
      {
            temp->link = top;
            top = temp;
      }
}
// Function body for delete stack elements
void stack::stackpop()
{
      node *temp;
      if (top == NULL)
      {
            cout << "Stack Empty ";
      }
      else
      {
            temp = top;
            top = top->link;
            temp->link = NULL;
            delete temp;
      }
}
// Function body for show stack elements
void stack :: show_Stack()
{
      node *temp;
      temp = top;
      clrscr();
      cout << "The values are \n";
      while (temp != NULL)
      {
            cout << "\n" << temp->name << "\t" << temp->age;
            temp = temp->link;
      }
}
// Main programming logic
void main()
{

      int  choice;
      stack   STACK;
      char opt = 'Y';       // To continue the do loop in case
      clrscr();
      do
      {
            cout << "\n\t\t Main Menu";
            cout << "\n\t1. Addition of Stack";
            cout << "\n\t2. Deletion from Stack";
            cout << "\n\t3. Traverse of Stack";
            cout << "\n\t4. Exit from Menu";
            cout << "\n\nEnter your choice from above ";
            cin >> choice;
```

```
            switch (choice)
            {
                  case 1:
                        do
                        {
                              STACK.stackpush();
                              cout<<"Do you want to add more elements<Y/N>?";
                              cin >> opt;
                        } while (toupper(opt) == 'Y');
                        break;
                  case 2:
                        opt = 'Y'; // Initialize for the second loop
                        do
                        {
                              STACK.stackpop();
                             cout<<"Do you want to delete more element<Y/N>?";
                              cin >> opt;
                        } while (toupper(opt) == 'Y');
                        break;
                  case 3:
                        STACK.show_Stack();
                        break;
                  case 4:
                        exit(0);
            }
      }
      while (choice != 4);
}
```

DATA FILE HANDLING

Q1, Assuming the class Vehicle as follows:

```
Class vehicle
{ char vehicletype[10];
int no_of wheels;
public:
      void getdetials()
      {    gets(vehicletype);
           cin>>no_of_wheels;
      }
      void showdetails()]
      {    cout<<"Vehicle Type"<<vehicletype;
            cout<<"Number of Wheels="<<no_of_wheels;
      }
}
```

Write a function showfile() to read all the records present in an already exiting binary file SPEED.DAT and display them on the screen ,also count the number of records present in the file.

Answer:

```
Void showfile()
{    ifstream fin;
     fin.open("SPEED.DAT",ios::in|ios::binary);
     vehicle  v1;
     int count=0;
     while (!fin.eof())
     {    fin.read((char *)&v1,sizeof(v1));
          count++;
          v1.showdetails();
     }
     cout<<"Total number of records are "<<count;
}
```

Q2. Write a program that prints a text file on the printer.

Answer:-

```
#include<iostream.h>
#include<fstream.h>
#include<process.h>
int main()
{    char filename[13], ch;
     cout<<"enter the text file name :";
     cin.getline(filename,13);
     ifstream fin;
     fin.open(filename);
     if(!fin)
     {cerr<<"\nFile can't be opened !\n";
     exit(-1);
     }
     ofstream fout;
     fout.open("PRN");
     while(fin.get(ch)!=0)
     fout.put(ch);
     return 0;
}
```

Q3. Write a c++ program ,which initializes a string variable to the content.”Time is a grat teacher but unfortunately it kills all its pupils.Berlioz”and output the string one character at a time to the disk file OUT.TXT .You have to include all the header files required.

Answer:

```
#include<fstream.h>
Int main()
{
      ofstream fout(“OUT.TXT”);
      Char*str=” Time is a grat teacher but unfortunately it kills all its
      pupils.Berlioz”;
      Int i=0;
      If(!fout)
      {
            cout<<”File cannot be opened “;
            return 0;
      }
      While (str[i]!=’\0’)
      {
            fout<<str[i];
            i++;
      }
fout.close();
}
```

Q4. Write a program that display the size of a file in bytes.

Answer:

```
#include<iostream.h>
#include<fstream.h>
#include<process.h>
#include<conio.h>
int main()
{
      char filename[13];
      clrscr();
      cout<”Enter Filename:\n”;
      cin.getline(filename,13);
      ifstream infile(filename);
      if(!infile)
      {
            cout>>”sorry ! Can not open “<<filename <<”file\n”;
            Exit(-1);
      }
      int no_bytes=0;
      char ch;
      while(cin.get(ch))
      {
            no_bytes ++;
      }
      cout<<”File Size is”<<no_bytes<<”bytes\n”;
return 0;
}
```

Q5. What will be the output produced by the following code?
Answer:

```
#include<iostream.h>
#include<fstream.h>
#include<process.h>
#include<conio.h>
int main()
{
clrscr()
char filename[13];
cout<<”Enter Filename:”;
cin.getline(filename,13);
ifstream in(filename);
if(!in)
{cout<<”Cannot open input file!\n”;
return (0)
}
Char str[255];
While(in)
{in.getline(str,255);
Cout<<str<<”\n”;
}
in.close();
return 0;
}
```

DATA BASE CONCEPT

Q.1. What is foreign Key? What is its purpose?

Ans: A non key attribute, whose value are derived from the primary key of some other table, is known as foreign key in the current table.

The table in which this non-key attribute i.e. foreign key attribute exists, is called a foreign table.

Q.2. Define the terms Tuple and Attribute

Ans: Tuples: The rows of tables (relations) are generally referred to as tuples.

Attribute: The columns of tables are generally referred to as attribute.

Q.3. What do you understand by the terms Cardinality and Degree of the table?

Ans Degree: The number of attributes in a relation determines the degree of a relation. A relation having 3 attributes is said to be a relation of degree 3.

Cardinality: The number of rows in a relation is known as Cardinality.

Q.4. What is the main function of DBA.

Ans: The DBA must be a manager, more than a technician-seeking to meet the needs of people who use the data. Since many user may share the same data resource, the DBA must be prepared to meet the need and objective.

Q.5. Write a query on the customers table whose output will exclude all customers with a rating <=100, unless they are located in Shimla.

Ans. SELECT * FROM customers WHERE rating >100 OR city ='Shimla' ;

Q.6. Write a query that selects all orders except those zeros or NULLs in the amount field.

Ans. SELECT * FROM Orders WHERE amt < >0 AND (amt IS NOT NULL) ;

Q.7. Write a query that lists customers in descending order of rating.
Output the rating field first, followed by the customer's name and number.

Ans. SELECT rating, cust-name, cust-num FROM customers ORDER BY rating DESC ;

Q.8. Write a command that puts the following values, in their given order, into the salesman table:
cust-name-Manisha, city-Manali, comm.- NULL, cust-num-1901.

Ans. INSERT INTO salesman (city, cust-name, comm.,cust-num)
VALUES('Manisha',NULL,1901) ;

Q.9. What are DDL and DML?

Ans:- The DDL provides statements for the creation and deletion of tables and indexes.
The DML provides statements to enter, update, delete data and perform complex queries on these tables.

Q.10. What is the difference between Where and Having Clause ?

Ans: The HAVING clause places the condition on group but WHERE clause places the condition on individual rows

Q.11. What do you understand by constraints ?

Ans: Constraints are used to enforce rules at table level when ever row is inserted, updated/deleted from table.
Constraints can be defined to one of the Two level.
Column Level: Reference to a single column. can be defined any type of integrity.

Table Level: References one or more columns and is defined separately from definition of the columns in the table.

Q.12. Write some features of SQL?

Ans: Recovery ad Concurrency:- Concurrency is concerned with the manner in which multiple user operate upon the Database.
Security: The Security can be maintained by view mechanism.
Integrity Constraints-> Integrity constraints are enforced by the system.

Q.13. Write various database objects available in SQL?

Ans: Table: A Table is used to store Data
View: A view is the temporary table created using Original table.
Sequence: Sequences are used to generate Primary key value.
Index: They are used to improve queries.
Synonym: They give alternative names to objects.

Q.14. Write the rules to name an objects?

Ans :

- The maximum length must be 30 character long.
- The Object name should not contain quotation mark.
- The name must start with letter.
- The use of $ and # is discouraged in the object name.
- A name must not be a reserved name.

Q.15. What are group Functions

Ans: The aggregate functions are group functions. They return result based on groups of rows. The group functions are
AVG(), COUNT(), MAX(), MI N(), SUM()

Q.16. What are column alias?

Ans: In many cases heading table may not be descriptive and hence it difficult to understand. In such case we use columns alias It will change column heading with column alias.

Q.17. Write the SQL query commands based on following table

Table : Book

Book_id	Book name	Author_name	Publisher	Price	Type	Quantity
C0001	Fast Cook	Lata Kapoor	EPB	355	Cookery	5
F0001	The Tears	William Hopkins	First Publi.	650	Fiction	20
T0001	My First c++	Brain & Brooke	FPB	350	Text	10
T0002	C++ Brain works	A.W. Rossaine	TDH	350	Text	15
F0002	Thunderbolts	Anna Roberts	First Publ.	750	Fiction	50

Table : issued

Book_Id	Quantity Issued
T0001	**4**
C0001	**5**
F0001	**2**

Write SQL query for (a) to (f)

(a) To show book name, Author name and price of books of First Pub. Publisher
(b) To list the names from books of text type
(c) To Display the names and price from books in ascending order of their prices.
(d) To increase the price of all books of EPB publishers by 50.
(e) To display the Book_Id, Book_name and quantity issued for all books which have been issued
(f) To insert a new row in the table issued having the following data. 'F0003', 1
(g) Give the output of the following
   i. Select Count(*) from Books
   ii. Select Max(Price) from books where quantity >=15
   iii. Select book_name, author_name from books where publishers='first publ.'
   iv. Select count(distinct publishers) from books where Price>=400

Ans:

(a) Select book_name, author_name , price from books where publisher='First Publ'
(b) Select book_name from books where type='Text'
(c) Select book_name, price from books Order by Price;
(d) Update books set price=price+50 where publishers='EPB'
(e) Select a.book_id,a.book_name,b.quantity_issued from books a, issued b where a.book_id=b.book_id
(f) Insert into issued Values ('F0003',1);
(g)
   i. 5
   ii. 750
   iii. Fast Cook Lata Kappor
   My First c++ Brain & Brooke
   iv. 1

Q.18.

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 I** 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, "COMP. 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

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

Ans:

(a) SELECT NAME FROM GRADUATE WHERE DIV='I' ORDER BY NAME;

(b) SELECT NAME, STIPEND, SUBJECT, STIPEND*12 STIPEND_YEAR FROM GRADUATE;

(c) SELECT SUBJECT, COUNT(NAME) FROM GRADUATE GROUPBY (SUBJECT) HAVING SUBJECT='PHYSICS' OR SUBJECT='COMP. Sc.';

(d) INSERT INTO GRADUATE VALUES(11,'KAJOL',300,'COMP. Sc.',75,1);

(e) (i) MIN(AVERAGE) 63

(ii) SUM(STIPEND) 800

(iii) AVG(STIPEND) 420

(iv) COUNT(DISTINCTSUBJECT) 4

(f) SELECT NAME, ADVISOR FROM GRADUATE, GUIDE WHERE SUBJECT=MAINAREA;

NAME	ADVISOR
DIVYA	RAJAN
SABINA	RAJAN
KARAN	VINOD
REKHA	VINOD
JOHN	VINOD

Q.19. Table: 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	24Friends 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

Table: 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';

Ans: (i) select firstname, lastname, address, city from employees where city='Paris';

(ii) select * from employees order by firstname desc;

(iii) select employees.firstname, employees.lastname, empsalary.salary + empsalary.benefits total_salary from employees, empsalary where employees.empid=empsalary.empid and designation='Manager';

(iv) select max(salary) from empsalary where designation in('Manager','Clerk')

(v) (i) select firstname, salary from employees, empsalary where designation='Salesman' and employees.empid=empsalary.empid

FIRSTNAME	SALARY
Rachel	32000
Peter	28000

(ii)select count(distinct designation) from empsalary;

COUNT(DISTINCTDESIGNATION)
4

(iii)select designation, sum(salary) from empsalary group by designation having count(*)>2;

DESIGNATION	SUM(SALARY)
Clerk	135000
Manager	215000

(iv)select sum(benefits) from empsalary where designation='Clerk';

SUM(BENEFITS)
32000

Boolean Algebra

1. **Prove that X.(X+Y)=X by algebraic method.**
   Solution:
   L.H.S.= X.(X+Y)=X .X + X .Y
   = X + X .Y
   = X .(1+Y)
   =X . 1 = X = R.H.S
2. **Give duals for the following :**
   a) A+ $\bar{A}$B
   b) AB+$\bar{A}$B
   Solution:
   a) A. ($\bar{A}$ +B) b) (A + B). ($\bar{A}$ + B)

3. **State and verify Involution law.**
   Solution:
   Involution Law states : $\bar{A} = \overline{A}$
   Truth Table:

A	$\bar{A}$	$\overline{\bar{A}}$
0	1	0
1	0	1

4. **State and verify Duality principle.**
   Solution:
   Principle of duality states that from every boolean relation, another boolean realation can be derived by
   (i) changing each OR sign(+) to an AND sign(-).
   (ii) changing each AND sign(-) to an OR sign(+)
   (iii) replacing each 1 by 0 and each 0 by 1.
   The new derived relation is known as the dual of the original relation.
   Dual of A+ $\bar{A}$B will be
   A+ $\bar{A}$B = A. ($\bar{A}$ +B).

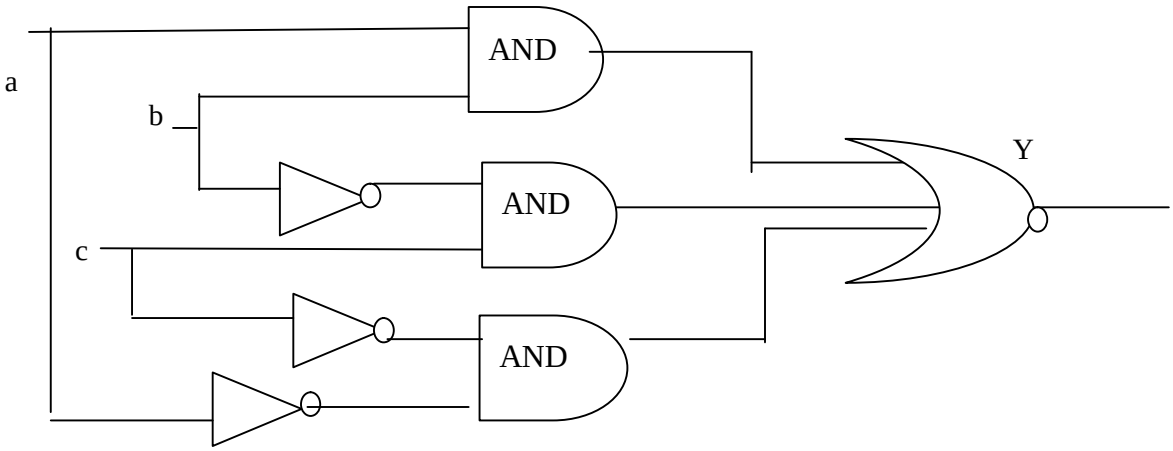
5. **State and verify Absorption law in boolean algebra**.
   Solution: Absorption law states:
   (i) X + XY= X (ii) X (X + Y) = X

Input		Output
X	Y	X + XY
0	0	0
1	1	0
1	0	1
1	1	1

6. Draw logic circuit diagram for the following expression:

$Y= AB+B\bar{C}+C\bar{\bar{A}}$

Solution:



7. State the distributive laws of boolean algebra.
Soln: Distributive laws states:
(i) X(Y+Z)=XY+XZ
(ii) X+YZ=(X+Y)(X+Z)

8. Reduce the following Boolean expression using K-Map:
F(P,Q,R,S)=Σ(0,3,5,6,7,11,12,15)

Soln:

	R'S'	R'S	RS	RS'
P'Q'	1 0	 1	1 3	 2
P'Q	 4	1 5	1 7	1 6
PQ	1 12	 13	1 15	 14
PQ'	 8	 9	1 11	 10

This is 1 quad, 2airs & 2 lock
Quad(m3+m7+m15+m11) reduces to RS
Pair(m5+m7) reduces to P'QS
Pair (m7+m6) reduces to P'QR
Block m0=P'Q'R'S'
M12=PQR'S'

hence the final expressions is F=RS + P'QS + P'QR + PQR'S' + P'Q'R'S'

9. Reduce the following Boolean expression using K-Map:

$F(A,B,C,D)=\prod(0,1,3,5,6,7,10,14,15)$

Soln:

0	0	0	
	0	0	0
		0	0
			0

Reduced expressions are as follows:

For pair 1, (A+B+C)
For pair 2, (A'+C'+D)
For Quad 1, (A+D')
For Quad 2, (B'+C')

Hence final POS expression will be

$Y(A,B,C,D)= (A+B+C)\ (A+C+\overline{D})\ (A+D)\ (\overline{B}+\overline{C})$

Communication and Network Concepts

Q.1 What is protocol? How many types of protocols are there?
Ans. When computers communicate each other, there needs to be a common set of rules and instructions that each computer follows. A specific set of communication rules is called a protocol.
Some protocol: PPP, HTTP, SLIP, FTP, TCP/IP

Q.2 What is the difference between Networking and Remote Networking?
Ans. The main difference between Networking and Remote Networking, is the network which we use in offices or other places locally such LAN or INTERNET and remote networking is one which we use TERMINAL Services to communicate with the remote users such WAN.

Q.3 What is point-to-point protocol?
Ans. A communication protocol used to connect computer to remote networking services include Internet Service Providers. In networking, the Point-to-Point protocol is commonly used to establish a direct connection between two nodes. Its primary use has been to connect computers using a phone line.

Q.4 How gateway is different from router?
Ans. A gateway operates at the upper levels of the OSI model and translates information between two completely different network architectures. Routers allow different networks to communicate with each other. They forward packets from one network to another based on network layer information. A gateway can interpret and translate the different protocols that are used on two distinct networks. Unlike routers that successfully connect networks with protocols that are similar, a gateway perform an application layer conversion of information from one protocol stack to another.

Q.5 What is the role of network administrator?
Ans. Basic tasks for which a network administrator may be responsible:
Setting up and configuring network hardware and software.
Installing and configuring network media and connections.
Connecting user nodes and peripherals of all kinds to the network.
Adding users to and removing users from the network.
Managing user account.
Ensuring the security of the network.
Provide training to the users to utilize the network's resources.

Q.6 What is the difference between baseband and broadband transmission?
Ans. Baseband is a bi-directional transmission while broadband is a unidirectional transmission.
No Frequency division multiplexing possible in base band but possible in broadband.

SNo	Baseband	Broadband
1	Entire bandwidth of the cable is consumed by a signal	broadband transmission, signals are sent on multiple frequencies, allowing multiple signals to be sent simultaneously.
2	Digital signals	Analog signals
3	bi-directional transmission	unidirectional transmission
4	No Frequency division multiplexing possible	Frequency division multiplexing possible
5	Uses for short distance	Uses for long distance

Q.7 What are the difference between domain and workgroup?
Ans.

SNo	Domain	Workgroup
1.	One or more computers are servers	All Computers are peers.
2.	If you have a user account on the domain, you can logon to any computer on the domain.	Each computer has a set of accounts.
3.	There can be 100+ computers	Typically not more then 20-30 computers
4.	The computers can be on different local network	All computers must be on the same local netork.

Q.8 What is the differences between POP3 and IMAP Mail Server?
Ans. IMAP is a standard protocol for accessing e-mail from a local server. A simpler e-mail protocol is Post Office Protocol 3 (POP3), which download mail to the computer and does not maintain the mail on the server. IMAP, e-mails are stored on the server, while in POP3, the messages are transferred to the client's computer when they are read.

Q.10 Name different layer of the ISO OSI Model.
Ans. International Standard Orrganisation – Open Systems Interconnection has seven layers;
Physical Layer
Data Link Layer
Network Layer
Transport Layer
Session Layer
Presentation Layer
Application Layer

Q.11 What is client server architecture?
Ans. To designated a particular node which is well known and fixed address, to provide a service to the network as a whole. The node providing the service is known as the server and the nodes that use that services are called clients of that server. This type of network is called Client-Server Architecture.

Q.12 What is FDM? Give example.
Ans. FDM-Frequency Division Multiplexing is used in analog transmission. It is often used in short distance. It is code transparent and any terminal of the same speed can use the same sub-channel after the sub-channel is established. The best example if FDM is the way we receive various stations in a radio.

Q.13 describe the following in brief:
i) MOSAIC ii) USENET iii) WAIS
Ans. i) MOSAIC: is the program for cruising the internet. The National centre wrote this program for Super Computer application at the university of Illinois. It has a simple window interface, which creates useful hypertext links that automatically perform some of the menu bar and button functions.
ii) USENET: is the way to meet people and share information. Usenet newsgroup is a special group set up by people who want to share common interests ranging from current topic to cultural heritages.
iii) WAIS: is a WIDE AREA INFORMATION SERVER.