Sample Paper
COMPUTER SCIENCE (Theory)
SET - 4
Class-XII

1(a)	**Name the header file to which the following belong:** **i. pow( )** **ii. random( )**	**1**
Ans.	i. math.h ii. stdlib.h	
(b)	**Illustrate the use of inline function in C++ with the help of an example.**	**2**

Ans.	C++ **inline** function is powerful concept that is commonly used with classes. If a function is inline, the compiler places a copy of the code of that function at each point where the function is called at compile time.
	Example:
	#include <iostream>
	inline int Max(int x, int y)
	{
	return (x > y)? x : y;
	}
	// Main function for the program
	int main( )
	{
	cout << "Max (20,10): " << Max(20,10) << endl;
	cout << "Max (0,200): " << Max(0,200) << endl;
	cout << "Max (100,1010): " << Max(100,1010) << endl;
	return 0;
	}
	output:
	Max (20,10): 20
	Max (0,200): 200
	Max (100,1010): 1010	

(c)	**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);
	}**
		2

Ans.	#include<iostream.h> #include<stdio.h> void main( ) { struct movie { char movie_name[20]; char movie_type; int ticket_cost;	

```
      //Initialization of variables inside a structure is not allowed.
              }MOVIE;
              gets(MOVIE.movie_name);
              cin>>MOVIE.movie_type;
              //A single character cannot be read using get
 }
```

(d) **Find the output of the following program:** **3**

```
#include<iostream.h>
#include<string.h>
class student
{       char *name;
        int l ;
        public:
        student( ) {l=0; name=new char l1+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 (SI, name3);
    S1.display ( );
    S2.display ( );
}
```

Ans. **output:**

Jack Jill

Jack JillJohn

(e) **Find the output of the following program:** **2**

```
#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>O);
    cout<<First-Second;
```

	}	
Ans.	**output** -2	
(f)	**What is a default constructor? How does it differ from destructor?**	**2**

Ans.	**Default constructor:** A construct or that accept s no parameter is called t he default construct or. With a default constructor, objects are created just the same way as variables of other data types are created.
	class X
	{
	int i ;
	public:
	int j, k ;
	------ / / Members
	Funct ions
	------ 	
	};
	Eg: X ob1;
	Student s1;
	A default constructor also called as non-parameterized constructor will take no argument and initialize the object with the predefined values in that constructor whereas A destructor is used to destroy the object s that have been created by a constructor. A destructor destroys the values of the object being destroyed.	

2(a)	**What is "this" pointer? Give an example to illustrate the use of it in C++.**	**2**

Ans.	A special pointer known as this pointer stores the address of the object that is currently invoking a member function. The this pointer is implicitly passed to the member functions of a class whenever they are invoked.
	Example
	#include<iostream.h>
	#include<conio.h>
	class Rectangle
	{ float area,len,bre;
	public:
	void input( )
	{ cout<<"\nEnter the length and breadth: ";
	cin>>this->len>>this->bre;
	}
	void calculate( )
	{
	area=len*bre;//Here Implicit 'this' pointer will be worked.
	}
	void output( )
	{
	cout<<"\nThe Area of the Rectangle: "<<this->area;
	}
	};
	void main( )
	{
	Rectangle R;
	clrscr( );
	R.input( );
	R.calculate( );
	R.output( );
	getch();	

	}	

(b)	**Answer the questions (I) and (ii) 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 1.
	ii. Write complete definition for Constructor 2.
		2

Ans.	i. Exam A(10); //invoking constructor 1 by passing a number.
	ii. Exam (Exam &t) //This is a copy constructor.
	{
	year=t.year;
	}	

(c)	**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 Draw Nos( ) 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.**	**4**

Ans.	`class HOUSING`
	`{`
	`int REG_NO;`
	`char NAME[31];`
	`char TYPE;`
	`float COST;`
	`public:`
	`void Read_Data( )`
	`{`
	`cout<<"\nEnter the House Registration Number: cin>>REG_NO;`
	`cout<<"\nEnter the House Name: ";`
	`gets(NAME);`
	`cout<<"\nEnter the House Type: ";`
	`cin>>TYPE;`
	`cout<<"\nEnter the House Cost: ";`
	`cin>>COST;`
	`}`
	`void Display()`
	`{`
	`cout<<"\nThe Registration Number of the House: "<<REG_NO;`
	`cout<<"\nThe name of the House: "<<NAME;`
	`cout<<"\nThe Type of the House: "<<TYPE;`	

```
      cout<<"\nThe Cost of the House: "<<COST;
    }
    void Draw_Nos();
};
void HOUSING::Draw_Nos( )
{ //Dear Students, a test for you.  Complete this member function.
}
```

(d) **Answer the questions (i) to (iii) based on the following code:** **1**

```
class furniture
{
    char Type;                                                    1
    char Model[10];                                               2
    public:
    furniture();
    void Read_fur_details( );
    void Disp_fur_detailsO;
};
    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_datel10l;
    public:
    void Read_office_details( );
    void Disp_office_details( );
  };
void main( )
{     office MyFurniture;

 }
```

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

Ans. **(i) Mention the member names which accessible by Myfurniture declared in main() function.**

Ans – **Data Members:** No data member can be called from Myfurnitureobject.

Member Functions:

Furniture::Read_fur_details()
Furniture::Disp_fur_details()
Sofa::Read_sofa_details()
Sofa::Disp_sofa_details()
Office::Read_office_details()
Office::Didp_office_details()

(ii) What is the size of Myfurniture in bytes?
Ans –29 Bytes

(iii) Mention the names of functions accessible from the member function read_office_details() of class office.
Ans – Furniture::Read_fur_details( )
Furniture::Disp_fur_details( )
Sofa::Read_sofa_details( )
Sofa::Disp_sofa_details( )
Office::Disp_office_details( )

3(a) **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:** **4**

If the array is 1, 2, 3,4,5,6 if the array is 1, 2, 3
The resultant 2 D array is given below The resultant 2 D array is given below

If the array is 1, 2, 3, 4, 5, 6
The resultant 2 D array is given below

1	2	0	0	0	0
1	2	0	0	0	0
1	2	3	0	0	0
1	2	3	4	0	0
1	2	3	4	5	0
1	2	3	4	5	0

If the array is 1, 2, 3
The resultant 2 D array is given below

1	0	0
1	2	0
1	2	3

Ans.

```
void Change2Darray(int x[],int size)
{
        for(i=0;i<size;i++)
        {
                for(int j=0;j< size;j++)
                {
                        if(i>=j)
                        {
                                        y[i][j]=x[j];
                         }
                         else
                        {
                                         y[i][j]=0;
                         }
                 }
         }
         for(i=0;i< size;i++)
         {
                   for(int j=0;j< size;j++)
                   {
                             cout<<y[i][j]<<" ";
                   }
                   cout<<endl;
          }
}
```

(b) **An array MAT [20] [10] is stored in the memory along the row with each element occupying 4 bytes of memory. Find out the base address and the address of element MATE[10][5] if the location of MAT [3][7] is stored at the address 1000.** **4**

Ans.

For Row wise allocation
Address of A[I][J] = BA + W((I-LBR) x N + (J-LBC))
Where
BA = Base Address
W = Size of each element in bytes = 4 bytes (given)
N = No. of columns in the 2D Array = 10 (given)
Address of MAT[3][7] given is 1000.
Therefore
(Assumption 1: LBR = LBC = 0)
MAT[3][7]=100 = BA + 4 (10 (3-0) + (7-0))
= BA + 148
BA = 1000 – 148
= 852
Therefore,
Base Address = 852
Thus, Address of MAT[10][5] = 852 + 4 (10 (10-0) + (5-0))
= 852+420
= 1272

(c) **4**

Introduction class stack
{ int data [10];
int top;
public:
stack( ) { top=-l }
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 which are equal to ITEM
};
Complete the class with all function definitions. Use another stack to transfer data temporarily.

Ans.

```
class stack
{
      int data[10];
      int top;
      public:
             stack( ) { top= -1; }
             void push( );
             void pop( );
             void delete (int item);
             void display( );
};
void stack: : push( )
{
      if (top == 9)
      {
            cout<<”Over flow”;
            return;
      }
      int x;
      cout<< “Enter data”;
      cin>>x;
      top++;
      data[top]=x;
}
void stack: : pop( )
```

```
{
      if (top == -1)
      {
            cout<<”Under flow”;
            return;
      }
      int x;
      x= data[top];
      top - -;
      cout<< x << removed;
}
void stack: : display ( )
{
      for(int i=top; i>=0;i--)
      cout<< data[i];
}
void stack:: delete (int item)
{
      stack t;
      if (top== -1)
      {
            cout<< “Under flow”;
            return;
      }
      while(top>=0)
      {
            if (data [top]!=item)
            {
                  t.top++;
                  t.data[t.top]=data[top];
            }
            top--;
      }
      while(t.top>=0)
      {
            top++;
            data[top]= t.data[t.top];
            t.top--;
      }
}
```

(d)	**Write a function in C++ to perform Insert operation in dynamically allocated Queue containing names of students.**	**3**

Ans.

```
struct NODE
{
};
char Name[20];
NODE *Link;
class QUEUE
{
      NODE *R,*F;
      public:
};
QUEUE();
void Insert();
void Delete();
```

	void QUEUE::Insert()
	{
	NODE *Temp;
	Temp=new NODE;
	gets(Temp->Name);
	Temp->Link=NULL;
	if (Rear==NULL)
	{
	Rear=Temp;
	Front=Temp;
	}
	else
	{
	Rear->Link=Temp;
	Rear=Temp;
	}
	}	

(e)	**Write the equivalent infix expression for** **10,3, *, 7,1, *, 23, +**	**2**
Ans.	10*3*(7-1)+23	
4(a)	**void main( )** **{ char ch='A';** **fstream fileout(" data.dat", Ios::app);** **fileout<<ch;** **int p fileout.tellg( );** **cout<<p;** **What is the output if the file content before the execution of the program is the string ? "ABC" (Note that" " are not part of the file)**	**1**
Ans.	4	
(b)	**Write a function to count the number of blanks present in a text file named "PARA.TXT".**	**2**

Ans.	void CountSpace()
	{
	fstream fin;
	fin.open("PARA.TXT", ios::in);
	//OR
	ifstream fin("PARA.TXT");
	char ch ;
	int count = 0;
	while(!fin.eof())
	{
	ch = fin.get();
	if (ch == ' ') //(ch==32) OR (ch==255)
	count ++;
	}
	cout<<"Number of spaces = "<<count; //Ignore
	fin.close(); //Ignore
	}	

(c)	**Following is the structure of each record in a data file named "PRODUCT.DAT".** **struct PRODUCT** **{ char Prodact_Code[10];** **char Product_Descriptionil[10];**	**3**

```
    int Stock;
};
```

Write a function in C++ to update the file with a new value of Stock. The Stock and the Product Code, whose Stock to be updated, are read during the execution of the program.

Ans.

```
void modify( )
{
      fstream out;
      out.open("PRODUCT.DAT",ios::binary|ios::in|ios::out);
      PRODUCT P1;
      int flag=0,stock;char PCode[10];
      gets(PCode);
      cin>>stock;
      while (out.read((char*)&P1, sizeof(P1))
            if (strcmp(P1.Product_code,Pcode)==0)
                  // strcmpi()may also be considered
            {
                  flag=1;
                  P1.Stock=stock;
                  int Position=out.tellg( )-sizeof(P1);
                  out.seekp(Position);
                  //OR
                  out.seekp(-sizeof(P1),ios::cur);
                  out.write((char*)&P1, sizeof(P1);
            }
}
if (flag==0) cout<<"Product Code does not match";
//OR
if (!flag) cout<<"Product Code does not match";
out.close();
```

5(a) **What are DDL and DML?** **2**

Ans. **DDL** means Data Definition Language. DDL provides statements for the creation and deletion of tables and indexes.

DML Means Data Manipulation Language. The DML provides statements to enter, update, delete data and perform complex queries on these tables.

(b) **Study the following tables FLIGHTS and FARES and write SQL commands for the questions (i) to (iv) and give outputs for SQL queries (v) to (vi).** **6**

TABLE : FLIGHTS

FL_NO	STARTING	ENDING	NO_FLIGHTS	NO STOPS
IC301	MUMBAI	DELHI	8	0
IC799	BANGALORE	DELHI	2	1
MC101	INDORE	MUMBAI	3	0
IC302	DELHI	MUMBAI	8	0
AM812	KANPUR	BANGALORE	3	1
IC899	MUMBAI	KOCHI	1	4
AM501	DELHI	TRIVANDRUM	1	5
MU499	MUMBAI	MADRAS	3	3

IC701	DELHI	AHMEDABAD	4	0

TABLE : FARES

FL_NO	AIRLINES	FARE	TAX%
1C701	Indian Airlines	6500	10
MU499	Sahara	9400	5
AM501	Jet Airways	13450	8
IC899	Indian Airlines	8300	4
1C302	Indian Airlines	4300	10<
1C799	Indian Airlines	10500	10
MC101	Deccan Airlines	3500	4

i. Display FL_NO and NO_FLIGHTS from "KANPUR" to "BANGALORE" from the table FLIGHTS.

ii. Arrange the contents of the table FLIGHTS in the ascending order of FL_NO.

iii. Display the FLNO and fare to be paid for the flights from DELHI to MUMBAI using the tables FLIGHTS and FARES, where the fare to be paid = FARE +FARE*TAX%/100.

iv. Display the minimum fare "Indian Airlines" is offering from the table FARES.

v. SELECT FL_NO, NO_FLIGHTS, AIRLINES from FLIGHTS, FARES where STARTING="DELHI" and FLIGHTS.FL_NO=FARES.FL_NO.

vi. SELECT count (distinct ENDING) from FLIGHTS.

Ans.

(i) Display FL_NO and NO_FLIGHTS from "KANPUR" TO "BANGALORE" from the table FLIGHTS.

Ans: Select FL_NO, NO_FLIGHTS from FLIGHTS where
Starting="KANPUR" AND ENDING="BANGALORE"

(ii) Arrange the contents of the table FLIGHTS in the ascending order of FL_NO.

Ans: SELECT * FROM FLIGHTS ORDER BY FL_NO;

(iii) Display the FL_NO and fare to be paid for the flights from DELHI to MUMBAI using the tables FLIGHTS and FARES, where the fare to be paid = FARE+FARE+TAX%/100.

Ans: SELECT FLIGHTS.FL_NO, FARE+FARE*TAX/100
FROM FLIGHTS, FARES WHERE FLIGHTS.STARTING='DELHI' AND
FLIGHTS.ENDING='MUMBAI' AND FLIGHTS.FL_NO=FARES.FL_NO;

***Assuming TAX% as TAX**

(iv) Display the minimum fare "Indian Airlines" is offering from the tables FARES.

Ans: SELECT MIN(FARE) FROM FARES WHERE AIRLINES='INDIAN AIRLINES';

v)Select FL_NO,NO_FLIGHTS,AIRLINES from FLIGHTS, FARES
Where STARTING = "DELHI" AND FLIGHTS.FL_NO = FARES.FL_NO

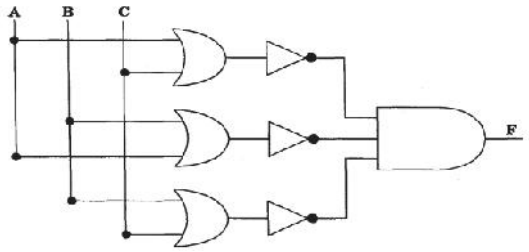
Ans:	**FL_NO**	**NO_FLIGHTS**	**AIRLINES**
	IC302	8	Indian Airlines
	AM501	1	Jet Airways

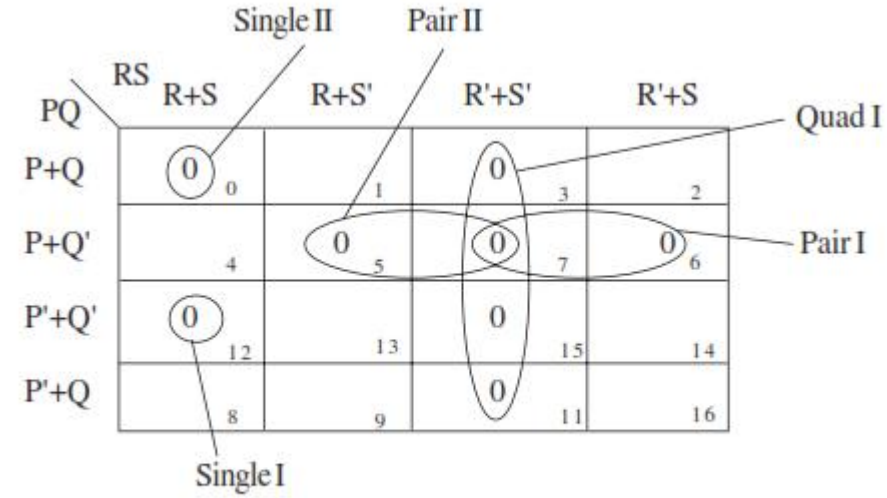
	IC701 4 Indian Airlines **(vi) SELECT count (distinct ENDING) from FLIGHTS.** **Ans:** 7	
6(a)	**State and verify Associative Law.**	**2**
Ans.	(i) X+(Y+Z)=(X+Y)+Z	

X	Y	Z	Y+Z	X+Y	X+(Y+Z)	(X+Y)+Z
0	0	0	0	0	0	0
0	0	1	1	0	1	1
0	1	0	1	1	1	1
0	1	1	1	1	1	1
1	0	0	0	1	1	1
1	0	1	1	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

(ii) X.(Y.Z)=(X.Y).Z

X	Y	Z	Y.Z	X.Y	X.(Y.Z)	(X.Y).Z
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	0	0
0	1	1	1	0	0	0
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	1	0	0
1	1	1	1	1	1	1

(b)	**Write the equivalent expression for the following logical circuit:**  	**2**
Ans.	(A+C)'.(A+B)'.(B+C)'	
(c)	**Express P+Q 'R in POS form.**	**2**
Ans.	(P+Q').(P+R) OR (P+Q'+R).(P+Q'+R').(P+Q+R)	

(d)	**Reduce the following Boolean expression using K-Map:** **F(P, Q, R, S) = π (0,3,5,6,7, 11, 12, 15)**	**3**
Ans.	 $F(P,Q,R,S)=(P+Q+R+S).(P'+Q'+R+S).(P+Q'+R').(P+Q'+S').(R'+S')$	
7(a)	**Name two transmission media for networking.**	**2**
Ans.	✓ Optical Fiber ✓ Ethernet Cable or twisted pair cable or UTP or STP ✓ Co-axial Cable ✓ Infrared ✓ Radio Link OR Radiowave ✓ Microwave link OR Microwave ✓ Satellite Link	
(b)	**Expand the following terms:** **i. XML ii. GSM iii. SMS iv. MAN**	**2**
Ans.	✓ **XML –**Extensible Markup Language ✓ **GSM –**Global System for Mobile communication ✓ **SMS –**Short Messaging Service ✓ **MAN –**Metropolitan Area Network	
(c)	**Differentiate between Hackers and Crackers.**	**2**
Ans.	**Hackers –**Computer enthusiasts who enjoy learning about computer systems and get into other system/network for gaining more knowledge or may find flaws in the system for rectification purposes. **Crackers –**Malicious programmers who break into secure systems for stealing and corrupting/spoiling data.	
(d)	**INDIAN PUBLIC SCHOOL in Darjeeling is setting up the network between its different wings. There are 4 wings named as SENIOR(S), JUNIOR(J), ADMIN(A) and HOSTEL(H).** **Distance between various wings are given below:**	**4**

Wing A to Wing S	**100m**
Wing A to Wing J	**200m**
Wing A to Wing H	**400m**
Wing S to Wing J	**300m**
Wing S to Wing H	**100m**
Wing J to Wing H	**450m**

	Number of Computers **Wing A** — **10** **Wing S** — **200** **Wing J** — **100** **Wing H** — **50** **i. Suggest a suitable Topology for networking the computer of all wings.** **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.**	**1** **1** **1** **1**
Ans.	(i) Star or Bus or any other valid topology or diagram. (ii) Wing S, because maximum number of computer are located at Wing S. (iii) Hub/Switch in all the wings. (iv)Coaxial cable/Modem/LAN/TCP-IP/Dialup/DSL/Leased Lines or any other valid technology.	