COMPUTER SCIENCE – 1998
(Delhi Board)

Time allowed: *3 hours* ***Max. Marks:*** *70*

Instructions: *(i) All the questions are compulsory.*
(ii) Programming Language: C++

QUESTION l.

(a) Define the following terms: 2

(i) Inheritance (ii) Encapsulation

(b) Name the header file, to which following built-in function belong to: 1

(i) cos() (ii) setw() (iii) toupper() (iv) strcpy()

(c) Find the syntax error, if any, in the following program 2

```
#include <iostream.h>
void main()
{
        int R;W = 90;
        while W > 60
        {
                R = W- 50;
                switch(W)
                {       20:cout << "Lower Range"<<endl;
                        30:cout<< "Middle Range"<< endl;
                        40: cout<< "Higher Range"<<endl;
                }
        }
}
```

(d) Give the output of the following program segment: 2

```
char *NAME = "IntRAneT";
for (int x = 0; x<strlen(NAME);x++)
        if(islower(NAME))
                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);
```

(e) Write the output of the following program 3

```
# include<iostream.h>
void Execute(int &X, int Y = 200)
{
        int TEMP = X + Y;
```

```
        X += TEMP;
        if (Y != 200)
                cout << TEMP << " " <<X<<" "<<Y<<endl;
}
void main()
{
        int A = 50, B = 20;
        Execute(B);
        cout << A << " " << B << endl;
        Execute(A,B);
        cout << A << " " << B << endl;
}
```

(f) Write a C++ function having two value parameters X and N with result type float to find the sum of series given below.

$1+X^1/2!+X^2/3!+...+ X^N/(N + 1)!$

QUESTION 2.

(a) What is a copy constructor? What do you understand by constructor overloading?

(b) Define a class student with the following specification

Private members of class student	
admno	integer
sname	20 character
eng. math, science	float
total	float
ctotal()	a function to calculate eng + math + science with float return type.

Public member function of class student

Takedata()	Function to accept values for admno, sname, eng, math, science and invoke ctotal() to calculate total.
Showdata()	Function to display all the data members on the screen.

(c) Consider the following declaration and answer the questions given below :

```
class PPP
{
        int H:
        protected :
                int S;
        public :
                void INPUT (int);
                void OUT();
};
class QQQ : private PPP
{
```

```
        int T;
        protected :
                int U;
        public :
                void INDATA(int, int);
                void OUTDATA();
};
class RRR : public QQQ
{
        int M;
        public :
        void DISP( void );
};
```

(i)Name the base class and derived class of the class QQQ.
(ii) Name the data member(s) that can be accessed from function DISP().
(iii) Name the member function(s), which can be accessed from the objects of class RRR.
(iv)Is the member function OUT() accessible by the object of the c.ass QQQ?

QUESTION 3.

(i) 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 to show presence of the number in the array. The function should have the parameters as (i) an array P (ii) the number DATA to be searched (iii) number of elements N.

(b) An array T [15] [10] is stored in the memory with each element requiring 2 bytes of storage. If the base address of T is 2000, determine the location of T[7][8] when the array is T stored by (i) row major (ii) column major.

(c) Write a user-defined function in C++ to display the sum of column elements of a two-dimensional arrray R[7][7] containing integers.

(d) Evaluate the following postfix expression using a stack and show the contents of stack after execution of each operation :

50,40,+,18, 14,-, *,+

(e)Give the necessary declaration of a linked implemented stack containing integer type numbers also write a user-defined function in C++ to pop a number from this stack.

QUESTION 4.

(a) Write name of two member functions belonging to fstream class

(b) Assuming the class EMPLOYEE given below, write functions in C++ to perform following:

(i) Write the objects of EMPLOYEE to a binary file.

(ii) Read the objects of EMPLOYEE from binary file and display them on screen.

```
class EMPLOYEE
{
```

```
        int ENO;
        char ENAME[10];
        public :
        void GETIT()
        {
                cin >> ENO;
                gets (ENAME);
        }
        void SHOWIT()
        {
                cout <<ENO << ENAME <<endl;
        }
};
```

QUESTION 5.

(a) What is a relation? What is the difference between a tuple and an attribute?

Note : Write SQL commands for (b) to (g) and write the outputs for (h) on the basis of table HOSPITAL.

Table : HOSPITAL

No.	Name	Age	Department	Charges	Sex
1	Arpit	62	21/01/98	300	M
2	Zarina	22	12/12/97	250	F
3	Kareem	32	19/02/98	200	M
4	Arun	12	11/01/98	300	M
5	Zubin	30	12/01/98	250	M
6	Ketika	16	24/02/98	250	F
7	Ankita	29	20/02/98	800	F
8	Zareen	45	22/02/98	300	F
9	Kush	19	13/01/98	800	M
10	Shilpa	23	21/02/98	400	F

(b) To select all the information of patients of cardiology department.

(c) To list the names of female patients who are in ENT department.

(d) To list names of all patients with their date of admission in ascending order.

(e) To display patient's name, charges, age for only female patients.

(f) To count the number of patient with Age < 30.

(g) To insert a new row in the HOSPITAL table with the following data:

11, "Aftab", 24, "Surgery". {25/02/98}, 300, "M"

(h) Give the output of following SQL statements:

(i) SELECT COUNT(DISTINCT charges) FROM hospital

(ii) SELECT MIN(age) FROM hospital WHERE sex = "F"

(iii) SELECT SUM(charges) FROM hospital WHERE department = "ENT":

(iv) SELECT AVG(charges) FROM hospital WHERE dateofadm<{12/02/98}

QUESTION 6.

(a) State DeMorgan's Law. Verify one of the Demorgan's Laws using truth tables.

(b) Prove X'Y + Z = (X' + Y' + Z)(X' +Y+Z)(X+Y + Z) algebraically.
(c) Write the dual of the Boolean expression (U+ W) (V'U + W).
(d) Obtain a simplified form for a Boolean expression
F(u,v,w,z) = ∑(0,1, 3, 5, 7, 9,10,11,12, 13,15) using K-Map.
(e) Draw the logic circuit for a half adder. 1
(f) Represent the Boolean expression X+ Y.Z' with the help of NOR gates only.
(g) Write the Product of Sum form of the function H(U,V,W), truth table representation of H is as follows :

U	V	W	H
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

QUESTION 7.
a) What are repeaters?
b) What is the difference between LAN and MAN?
c) Describe the following in brief:
(i)MOSAIC (ii) Usenet
d) What do you understand by a backbone network?