COMPUTER SCIENCE – 2000
(Delhi Board)

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

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

Question 1.
   (a) Illustrate the concept of function overloading with the help of an example.
   (b) Name the header file, to which following built-in functions belong:
           (i) isupper() (ii) setw() (iii) exp() (iv) strcmp()
   (c) Will the following program execute successfully? If no, state the reason (s).

```
#include<stdio.h>
void main ()
{
   int s1, s2, num;
   s1 = s2 = 0;
   for (x = 0; x<11; x++)
   {
       cin << num;
       if (num>0)
           s1 += num;
       else
           s2 = /num;
   }
   cout << s1 << s2;
}
```

   (d) Give the output of following program segment (Assuming all required header files are
           included in the program).

```
char *NAME = "a ProFile";
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-1]);
           else
               NAME [x]--;
cout << NAME << endl;
```

   (e) Write the output of the following program:

```
# include <iostream.h>
int func(int &x, int y = 10)
{
```

```cpp
        if (x%y == 0)
            return ++x;
        else
            return y--;
    }
    void main()
    {
        int p=20, q=23;
        q=func (p,q);
        cout << p << " " << " " << q << endl;
        p=func (q);
        cout<< p << " " << " " << q << endl;
        q=func (p);
        cout << p << " " << " " << q << endl;
    }
```

(f) Write a function SEQSUM() in C++ with two arguments, double x and int n. The function should return a value of type double and it should find the sum of the Following series :

$$1 + x / 2! + x^2 / 4! + x^3 / 6! + x^4 / 8! + x^5 /10! + ... + x^n / (2n)!$$

Question 2.

(a) Why is a destructor function required in classes? Illustrate with the help of an example.

b) Define a class WORKER with the following specification :

Private members of class WORKER:
wno   integer
wname   25 characters
hrwrk, wgrate float (hours worked and wage rate per hour)
totwage   float (hrwrk * wgrate)
calcwg () A function to find hrwrk * wgrate with float return type.
Public members of class WORKER
in_data () a function to accept values for wno, wname, hrwrk, wgrate and invoke calcwg() function to calculate totpay.
out_data () a function to display all the data members on the screen. You should give definitions of functions.

c) Consider the following and answer the questions given below : 4
```cpp
class School
{
    int A;
    protected :
    int B,C;
    public:
    void INPUT (int);
```

```cpp
        void OUTPUT ();
    };
    class Dept: protected School
    {
        int X Y;
        protected :
        void IN (int, int);
        public:
        void OUT();
    };
    class Teacher : public  Dept
    {
        int P;
        void DISPLAY (void);
    public :
        void ENTERO;
    };
```

   i.   Name the base class and derived class of the class Dept.

  ii.   Name the data member (s) that can be accessed from function OUT ().

 iii.   Name the private member function(s) of class Teacher.

 iv.   Is the member function OUT() accessible by the objects of Dept?

Question 3.

(a) Suppose A, B, C are arrays of integers of size M, N, and M + N respectively. The numbers in array A appear in ascending order while the numbers in array B appear in descending order. Write a user defined function in C++ to produce third array C by merging arrays A and B in ascending order. Use A, B and C as arguments in the function.

b) An array VAL ([1..15][1..10] is stored in the memory with each element requiring 4 bytes of storage. If the base address of array VAL is 1500, determine the location of VAL (12] [9], when the array VAL is stored (i) Row wise (ii) Column wise. 3

c) Write a user-defined function in C++ to find and display the sum of both the diagonal elements of a two-dimensional array MATRIX [6] [6] containing integers.

d) Evaluate the following postfix expression using a stack. Show the contents of stack after execution of each operation.

20, 8, 4,/, 2,3,+,*,-

e) Give necessary declarations for a queue containing float type numbers; also write a user-defined function in C++ to insert a float type number in the queue. You should use linked representation of queue.

Question 4.

(a) Name two member functions of ofstream class.

(b) Assuming the class? DRINKS defined below, write functions in C++ to perform the following:

   i.   Write the objects of DRINKS to a binary file.

ii. Read the objects of DRINKS from binary file and display them on the screen when DNAME has value "INDY COLA".

```
class DRINKS
{
    int DCODE;
    char DNAME[13];     // Name of the drink
    int DSIZE;// Size in liters
    float DPRICE;
 public:
    void GETDRINKS()
    {
        cin >> DCODE >> DNAME >> DSIZE >>DPRICE;
    }
    void SHOWDRINKS ()
    {
        cout<< DCODE << DNAME << DSIZE << DPRICE << endl;
    }
    char *GETNAME ()
    {
        return DNAME;
    }
};
```

Question 5.
a) What is the need for normalization ? Define first, second and third normal forms.

Write SOL commands for (b) to (e) and write the outputs for (g) on the basis of table CLUB.

TABLE : CLUB

Coach ID	CoachNAME	AGE	SPORTS	Dateofapp	PAY	SEX
1	KUKERJA	35	KARATE	27/03/1996	1000	M
2	RAVINA	34	KARATE	20/ 01/1998	1200	F
3	KARAN	34	SQUASH	19/02/1998	2000	M
4	TARUN	33	BASKETBALL	01/01/1998	1500	M
5	ZUBIN	36	SWIMMING	12/01/1998	750	M
6	KETAKI	36	SWIMMING	24/02/1998	800	F
7	ANKITA	39	SQUASH	20/02/1998	2200	F
8	ZAREEN	37	KARATE	22/02/1998	1100	F
9	KUSH	41	SWIMMING	13/01/1998	900	M
10	SHAILYA	37	BASKETBALL	19/02/1998	1700	M

(b) To show all information about the swimming coaches in the club.
(c) To list name of all coaches with their date of appointment (DATEOFAPP) in descending order.

(d) To display a report, showing coachname, pay, age and bonus (15% of pay) for all the coaches.

(e) To insert a new row in the CLUB table with the following data :

11, "PRAKASH", 37, "SQUASH", {25/02/98}, 2500, "M"

(f) Give the output of following SQL statements :

(i) SELECT COUNT (DISTINCT sports) FROM club;

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

(iii) SELECT AVG(pay) FROM club WHERE sports ="KARATE";

(iv) SELECT SUM(pay) FROM club WHERE dateofapp > {31/01/98};

(g) Assume that there is one more table COACHES in the database as shown below:

TABLE:COACHES

SPORTS PERSON	SEX	COACH-NO
AJAY	M	1
SEEMA	F	2
VINOD	M	1
TANEJA	F	3

What will be the output of the following query :

SELECT sportsperson, coachname FROM club, coaches WHERE coach id = coach no;

Question 6.

(a) State Absorption Laws. Verify one of the Absorption Laws using truth tables.

(b) Prove $X'.Y + Y'.Z = X'.Y.Z + X'.Y'.Z' + XA''.Z + X'.Y'.Z$ algebraically.

(c) Obtain simplified form for a Boolean expression

$F(x,y,z,w) = \sum(1,3, 4, 5, 7, 9,11, 12, 13, 15)$ using Karnaugh Map.

(d) Draw the logic circuit for a half adder.

(e) Represent the Boolean expression $X'Y + Y'Z$ with the help of NAND gates only.

(f) Write the Sum of Products form of the function G(U,V,W), truth table representation of G is as follows:

U	V	W	G
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Question 7.

(a) What are Routers ?

(b) What is the purpose of using a MODEM ?

(c) Write the two advantages and two disadvantages of Bus Topology in network.

(d) What is the difference between LAN and WAN ?

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