

COMPUTER SCIENCE – 1999
(Delhi Board)

Time allowed: 3 hours

Max. Marks: 70

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

QUESTION I.

- (a) Why main function is special ? Give two reasons.
(b) Name the header files of C++ to which the following functions belong:
(i) strcat () (ii) scanf () (iii) getchar() (iv) clrscr ()
(c) Find the syntax error (s), if any, in the following program:

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

Give the output of the following program:

```
# include <stdio.h>
void main()
{
    char *p = "Difficult";
    char c;
    c = *p++;
    printf("%c",c);
}
}
```

(e) Write the output of the following program :

```
# include <iostream.h>
static int i=100;
void abc()
{
    static int i=8;
    cout<< "first=" <<i;
}
main()
{
```

```

static int i = 2;
abc();
cout << "second =" << i << endl;
}

```

(f) Write a C++ function that converts a 2-digit octal number into binary number and prints the binary equivalent.

QUESTION 2.

(a) What do you understand by visibility modes in class derivations? What are these modes?

(b) Define a class Teacher with the following specifications :

Private members :

name	20 characters
subject	10 characters
basic, DA, HRA	float
salary	float
calculate	A function that computes the salary and returns it. Salary is sum of basic, DA and HRA.

Public members :

Readdata()	A function that accepts data values and invokes the Calculate function.
Displaydata()	A function that prints the data on the screen.

(c) Consider the following declarations and answer the question given below :

```

class vehicle
{
private:
    int wheels;
protected :
    int passenger;
public :
    void inputdata (int, int);
    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(char);
        void displaydata();
};

```

- (i) Name the base class and derived class of the class heavy_vehicle.
- (ii) Name the data member(s) that can be accessed from function displaydataO.
- (iii) Name the data member's that can be accessed by an object of bus class.
- (iv) Is the member fraction outputdata() accessible to the objects of heavy_vehicle class.

QUESTION 3.

- (a) Suppose a one-dimensional array AR containing integers is arranged in ascending order. Write a user-defined function in C++ to search for an integer from AR with the help of Binary search method, returning an integer 0 to show absence of the number and integer 1 to show presence of the number in the array. Function should have three parameters : (i) array AR (ii) the number to be searched and (iii) the number of elements N in the array.
- (b) An array A[10][20] is stored in the memory with each element requiring 2 bytes of storage. If the base address of the array in the memory is 400, determine the location of A[8][13] when the array is stored as (i) row major (ii) column major.
- (c) Write a user-defined function in C++ to display the multiplication of row element of two-dimensional array A[4][6] containing integer.
- (d) Evaluate the following postfix expression using a stack and show the contents of the stack after execution of each operation.
5,11, 6, 8, +, 12, *, /
- (e) Give the necessary declaration of a linked list implemented queue containing float type values. Also write a user-defined function in C++ to delete a float type number from the queue.

QUESTION 4.

- (a) Differentiate between read() & write() functions.
- (b) Assuming the class FLOPPYBOX. write functions in C++ to perform the following: 4
 - (i) Write the object of FLOPPYBOX to a binary file.
 - (ii) Read objects of FLOPPYBOX from the binary and display on the screen

```

class FLOPPYBOX
{
    int size;
    char name[10];
public :
    void getdata()
    {
        cin >> size;
        gets (name);
    }
    void showdata ()
    {
        cout << size << " " << name << endl;
    }
};

```

}
};

QUESTION 5.

(a) What is normalization ? Define second normal form.

Note: Write SQL commands for (b) to (g) and write the output for (h) on the basis of teacher relation given below:

RELATION : TEACHER

No	Name	Age	Department	Dateofjoin	Salary	Sex
1	Jugal	24	Computer	10/01/97	12000	M
2	Sharmila	21	History	24/03/98	20000	F
3	Sandeep	22	Maths	12/12/96	30000	M
4	Sangeeta	25	History	01/07/99	40000	F
5	Rakesh	22	Maths	05/09/97	25000	M
6	Shyam	30	History	27/06/98	30000	M
7	Shiv Om	34	Computer	25/02/97	21000	M
8	Shalakha	23	Maths	31/07/97	20000	F

(b) To show all information about the teacher of History department.

(c) To list the name of female teachers who are in Hindi department.

(d) To list the names of all the teachers with their date of joining in ascending order.

(e) To display Teachers Name, Salary, Age for male teachers only.

(f) To count the number of teachers with age > 23.

(g) To insert a new row in the Teacher table with the following data.

9, "Raja", 26, "Computer", { 13/05/95 }, 2300, "M"

(h) Give the output of the following SQL statements :

(i) SELECT COUNT (DISTINCT department) FROM teacher;

(ii) SELECT MAX(age) FROM teacher WHERE sex = "F";

(iii) SELECT AVG(salary) FROM teacher WHERE sex = "M";

(iv) SELECT SUM(salary) FROM teacher WHERE dateofjoin < { 12,07/96 };

QUESTION 6.

(a) State the distribute law. Verify the law using truth table.

(b) Prove $x + x'y = x + y$ algebraically.

(c) Write the dual of the Boolean expression $(x+y).(x'+y')$.

(d) Minimize $F(w,x,y,z)$ Karnaugh map.

$$F(w, x, y, z) = \sum(0, 4, 8, 12)$$

(e) Draw a logic circuit of Half Adder.

(f) Represent the Boolean expression $(x+y)(y+z)(z+x)$ with the help of NOR gates only.

(g) Write the sum of product form of the function $F(x,y,z)$. The truth table representation of F is given as follows :

x	y	Z	F
0	0	0	0
0	0	1	1
0	1	0	0

0	1	1	0
1	0	0	1
1	0	1	0/
1	1	0	1
1	1	1	1

QUESTION 7.

- (a) What is a bridge?
- (b) What is the purpose of using FTP?
- (c) Give two advantages and two disadvantages of the following network topologies-Bus and Tree.
- (d) What is the difference between WAN and MAN?

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