Computer Science 2006 (Delhi)

General Instructions:

1. All questions are compulsory.
2. Programming Language: C++

Q. 1.

a. Name the header file to which the following belong **(1)**
   i. abs( )
   ii. isupper( )

b. Illustrate the use of #define in C++ to define a macro. **(2)**

c. Rewrite the following program after removing the syntactical error(s), if any. Underline each correction. **(2)**

```
# include <iostream.h>
void main()
{       struct STUDENT
        {       char stu_name [20];
                char stu_sex;
                int stu_age=17;
        } student;
            gets(stu_name);
            gets(stu_sex);
}
```

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

```
# include<iostream.h>
#include<string.h>
class state
{       char * state_name;
        int size;
        public;
        state( ); { size=0; state_name=new char[size+1]; }
        state(char *s)
        {       size = strlen(s) ; state_name = new char[size+1];}
                strcpy(state_name,s);
       }
       void display() {cout<<state name<<endl; }
       void Replace (state &a, state &b)
        {       size = a.size + b.size;
               delete state_name;
               state_name = new char[size+1] ;
               strcpy(state_name, a.state_name);
               strcat(state_name, b.state_name);
        }
};
```

```
void main( )
{           char *temp = "Delhi";
            state state1(temp), state2("Mumbai"), state3("Nagpur"), SI, S2;
            SI .Replace(state1, state2);
            S2.Replace(S1, state3);
            S1.display( );
            S2.display( );
}
```

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

```
#include<iostream.h>
void main( )
{     long NUM = 1234543;
      int F = 0, S = 0;
      do
{     int Rem = NUM% 10;
      if (Rem % 2 !=0)
           F+ =R;
      else
           S+ = R;
     NUM/=10;
} while(NUM>0);
cout<<F-S;
}
```

f. What are Nested Structures? Give an example. **(2)**

Q. 2.

a. Define Multilevel and Multiple inheritance in context of Object Oriented Programming. Give suitable example to illustrate the same. **(2)**

b. Answer the questions (i) and (ii) after going through the following class:

```
class Interview
{   int month;
    public:
    Interview (int y) {month=y ;} //Constructor 1
    Interview (Interview&t); //Constructor 2
};
```

i. Create an object, such that it invokes Constructor 1 **(1)**

ii. Write complete definition for Constructor 2 **(1)**

c. Define a class named ADMISSION in C++ with the following descriptions: **(4)**

Private members:
AD_NO integer (Ranges 10 - 2000)
NAME Array of characters (String)
CLASS Character
FEES Float
Public Members:

- Function Read_Data ( ) to read an object of ADMISSION type
- Function Display() to display the details of an object

- Function Draw-Nos ( ) to choose 2 students randomly.

And display the details. Use random function to generate admission nos. to match with AD_NO.

d. Answer the questions (i) to (iii) based on the following code

```
class stationary
{
        char Type;
        char Manufacturer [10];
        public:
        stationary();
        void Read_sta_details( );
        void Disp_sta_details( );
};
class office: public stationary
{
        int no_of_types;
        float cost_of_sta;
        public:
        void Read_off_details( );
        void Disp_off_details( );
};
class printer: private office
{
        int no_of_users;
        char delivery_date[10];
        public:
        void Read_pri_details( );
        void Disp_pri_details( );
};
void main ( )
{       printer MyPrinter;      }
```

i. Mention the member names which are accessible by MyPrinter declared in main() function
ii. What is the size of MyPrinter in bytes?
iii. Mention the names of functions accessible from the member function Read_pri_details () of class printer. **(4)**

Q. 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. (**3**)

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

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

below

	2	3	4		6	1	2	3
1	2	3	4	5	0	1	2	0
1	2	3	4	5	0	1	0	0
1	2	3	0	0	0			
1	2	0	0	0	0			
1	0	0	0	0	0			

b.

c. An array MATI3OII1OJ is stored in the memory column wise with each element occupying 8 bytes of memory. Find out the base address and the address of element MATI2OII5I, if the location of MATI5JL7] is stored at the address 1000. **(4)**

d. class queue **(4)**

```
{       int data [10];
        int front, rear;
        public:
        queue ( ) (front= -1; rear= -1;)
        void add( );                //to add an element into the queue
        void remove( );             //to remove an element from the queue
        void Delete(int ITEM);   //To delete all elements which are equal to ITEM
} ;
```

Complete the class with all function definitions for a circular array Queue. Use another queue to transfer data temporarily

e. Write a function in C++ to perform Push operation on a dynamically allocated stack containing real number. **(3)**

f. Write the equivalent infix expression for
a, b, AND, a, c, AND, OR **(2)**

Q. 4.

a. **(1)**

```
void main( )
      {   char='A';
          fstream fileout("data.dat",ios::out);
          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)

b. Write a function to count the number of words present in a text file named "PARA.TXT". Assume that each word is separated by a single blank/space character and no blanks/spaces in the beginning and end of the file. **(2)**

c. Following is the structure of each record in a data file named "COLONY.DAT". **(3)**

struct COLONY

```
{      char Colony Code[10];
       char Colony Name[10];
       int No of People;
};
```

Write a function in C++ to update the file with a new value of No _of_People. The value of Colony_Code and No_of_People are read during the execution of the program.

Q. 5.

a. What is an Alternate Key? **(2)**

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

TABLE : DOCTOR

ID	NAME	DEPT	SEX	EXPERIENCE
101	John	ENT	M	12
104	Smith	ORTHOPEDIC	M	5
107	George	CARDIOLOGY	M	10
114	Lara	SKIN	F	3
109	K George	MEDICINE	F	9
105	Johnson	ORTHOPEDIC	M	10
117	Lucy	ENT	F	3
111	Bill	MEDICINE	F	12
130	Morphy	ORTHOPEDIC	M	15

TABLE : SALARY

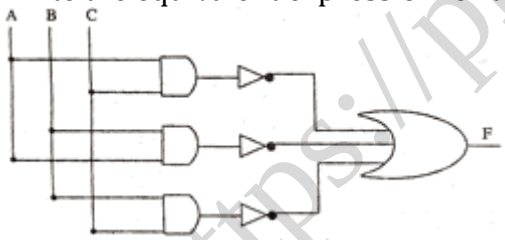
1D	BASIC	ALLOWANCE	CONSULTATION
101	12000	1000	300

104	23000	2300	500
107	32000	4000	500
114	12000	5200	100
109	42000	1700	200
105	18900	1690	300
130	21700	2600	300

i. Display NAME of all doctors who are in "MEDICINE" having mo than 10 years experience from the table DOCTOR.
ii. Display the average salary of all doctors working in "ENT" department using the tables DOCTOR and SALARY. Salary = BASIC + ALLOWANCE
iii. Display the minimum ALLOWANCE of female doctors.
iv. Display the highest consultation fee among all male doctors.
v. SELECT count(*) from DOCTOR where SEX "F"
vi. SELECT NAME, DEPT, BASIC from DOCTOR, SALARY where DEPT = "ENT" and DOCTOR.ID = SALARY.ID

Q. 6.

a. State and verify Distributive Law. **(2)**
b. Write the equivalent expression for the following Logical Circuit: **(2)**



c. Express P+Q'R in canonical SOP form. **(1)**
d. Reduce the following Boolean expression using K-Map. **(3)**
F(P, Q ,R, S) = ∑ (0,3,5,6,7,11,12,15)

Q. 7.

a. Differentiate between Internet and Intranet. **(1)**
b. Expand the following terms
   i. CDMA
   ii. URL
   iii. HTTP
   iv. WAN **(2)**
c. Write one advantage of STAR topology as compared to BUS topology. **(1)**

d. UNIVERSITY OF CORRESPONDENCE in Allahabad is setting up the network between its different wings. There are 4 wings named as Science (S), Journal ism (J), ARTS (A) and Home Science (H).
Distance between various wings are given below

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

Number of Computers

Wing A	150
Wing S	10
Wing J	5
Wing H	50

i. Suggest a suitable Topology for networking the computer of all wings. **(1)**
ii. Name the wing where the Server to be installed. Justify your answer. **(1)**
iii. Suggest the placement of Hub/Switch in the network. **(1)**
iv. Mention an economic technology to provide Internet accessibility to all wings. **(1)**