Computer Science   2006 (Compartment Delhi)

General Instructions:

3. All questions are compulsory.
4. Programming Language: C++

Q. 1.

a. Name the header file to which the following belong: **(1)**
   (i) gets( )
   (ii) open( )
b. Illustrate the use of local and global variables in C++. **(2)**
c. Rewrite the following program after removing the syntactical error(s), if any Underline each correction, **(2)**

```
#include <iostream.h>
void main( )
{    struct TV
     {    char Manu_name[20];
          char Tv_Type;
          int Price = 17000;
     }    New Tv;
          gets(Manu_name);
          gets(Tv_Type);
}
```

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

```
#include<iostream.h>
#include<string.h>
class country
{      char *country name;
       int length;
       public:.
       country ( ) {length =0; country_name=new char [length+1];}
       country (char *s)
       {      length = strlen(s); country_name=new char [length +1];
              strcpy (country_name, s);
       }
       void display () { cout<< country_name <<endl;}
       void Replace (country & a, country & b)
       {      length a.length + b.length;
              delete country_name;
              country_name=new char [length + 1];
              strcpy (country_ name, a.country_name);
              strcat (country_name, b.country name);
              }
};
void main ( )
{      char * temp = "India";
       country country1 (temp), country2 ("Nepal"), country3 ("China"), S1,S2;
       S1.Replace (country1, country2);
```

```
        S2.Replace (S1,country3);
        S1.display( );
        S2.display ( );
    }
```

e. Find the output of the following program: **(2)**
```
#include < iostream.h>
void main( )
{       int *Pointer Array [10];
        int marks [ = {75, 68, 90, 34, 0, 10, 90, 65};
        for (int I = 0; marks [ I]!=0; I++)
        {       PointerArray [I]=&marks[I];
                * (PointerArray [I] ) += 5;
        }
        int index = 0;
        while(index < I )
        {       int p=*(PointerArray[index] );
                if(p >=60) cout <<p<<',';
                index ++;
        }
}
```

f. What is the importance of constructor in object oriented programming? Explain with the help of an example.   **(2)**

Q. 2.

a. What is the difference between Multilevel and Multiple Inheritance in context to object oriented programming?   **(2)**

b. Given a class as follows:
```
class Match
{       int Time;
        public:
        Match (int y) { Time = y;}       //Constructor 1
        Match (Match& t);                //Constructor 2
};
```
    i.   Create an object, such that it invokes Constructor 1.
    ii.   Write complete definition for Constructor 2.

c. Define a class named MOVIE in C++ with the following description   **(4)**
    Private members

HALL_NO	integer
MOVIE_NAME	Array of characters (String)
WEEK	integer (Total number of weeks the same movie is shown)
WEEK_COLLECTION	Float
TOTAL_COLLECTION	Float

    Public Members
    - Function Read_Data( ) to read an object of ADMISSION type
    - Function Display( ) to display the details of an object
    - Function Update( ) to update the total collection and Weekly collection once the week changes. Total collection will be incremented by Weekly collection and Weekly collection is made Zero.

    Answer the questions (i) to (iii) based on the following code:
```
class toys
{
```

```cpp
        char Code;
        char Manufacturer [10];
    public:
        toys( );
        void Read_toy_details ( );
        void Disp_toy_details( );
};
class electronic : public toys
{
        int no_of_types;
        float cost_of_toy;
    public:
        void Read_elect_details ( );
        void Disp_elect_details ( );
};
    class infants : private electronic
{
        int no_of_buyers;
        char delivery date[10];
    public:
        void Read_infant_details ();
        void Disp_jnfant_details();
};
void main ( )
{    infants MyToy;     }
```

     .   Mention the member names which are accessible by MyToy declared in main () function.**(1)**

    i.   What is the size of MyToy in bytes? **(1)**

    ii.   Mention the names of functions accessible from the member function Read_infant_details () of class printer. **(2)**

Q. 3.

a. Write a function in C++ which accepts an integer array and its size as arguments/ parameters and then assigns the elements into a two dimensional array of integers in the following format: **(4)**

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

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

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

0	0	1
0	2	1
3	2	1

b. An array MAT [15] [7] is stored in the memory along the column with each element occupying 2 bytes of memory. Find out the base address and the address of element MAT [2] [5], if the location of MAT [5] [4] is stored at the address 100. **(4)**

c. What is circular queue? How is it different from simple queue?
   Write a function in C++ to perform Delete operation in dynamically allocated Queue containing names of students. **(4)**
d. Write a function bubble sort to sort the passed array of 10 integers in descending order using bubble sort.
e. Evaluate the following postfix expression using a stack and show the contents of the stack after execution of each operation.
   5,10,*,20,2,/,+

Q. 4.

a. Write a function to count the number of VOWELS present in a text file named "PARA.TXT". **(3)**
b. Following is the structure of each record in a data file named "VEHICLE.DAT".
   struct VEHICLE
   {   char Vehicle_Code [10];
         char Vehicle_Name[10];
         float cost;
   };
   Write a function in C++ to update the tile with a new value of cost for a particular Vehicle. The value of Vehicle_Code and cost are read during the execution of the program. **(3)**

Q. 5.

a. What is a Candidate Key? **(2)**
b. Study the following tables STAFF and SALARY and write SQL commands for the questions (i) to (iv) and give outputs for SQL queries (v) to (vi). **(6)**
   TABLE: STAFF

ID	NAME	DEPT	SEX	EXPERIENCE
101	Siddharth	SALES	M	12
104	Raghav	FINANCE	M	5
107	Naman	RESEARCH	M	10
114	Nupur	SALES	F	3
109	Janvi	FINANCE	F	9
105	Rama	RESEARCH	M	10
117	James	SALES	F	3
111	Binoy	FINANCE	F	12

| 130 | Samuel | SALES | M | 15 |

c.

TABLE SALARY

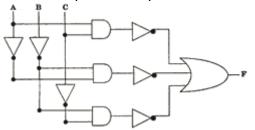| ID	BASIC	ALLOWANCE	COMMISSION%
101	12000	1000	3
104	23000	2300	5
107	32000	4000	5
114	12000	5200	10
109	42000	1700	20
105	18900	1690	3
130	21700	2600	30

    i.   Display NAME of all staff who are in "SALES" having more than 10 years experience from the table STAFF.

    ii.   Display the average salary of all staff working in "FINANCE" department using the tables STAFF and SALARY. SALARY BASIC + ALLOWANCE.

    iii.   Display the minimum ALLOWANCE of female staff.

    iv.   Display the highest commission% among all male staff.

    v.   SELECT count (*) from STAFF where SEX = "F".

    vi.   SELECT NAME, DEPT, BASIC from STAFF, SALARY where DEPT = "SALES" and STAFEID = SALARY.ID.

Q. 6.

a. State and verify De Morgan's theorem. **(2)**

b. Write the equivalent expression for the following logical circuit: **(2)**

c. Express P' + QR' in canonical SOP form.

d. Reduce the following Boolean expression using K-Map:
F(P,Q,R,S)=∑(l,3,5,8,11,12,15

Q. 7.

a. Explain function of Modem and Switch.
b. Expand the following terms:
    i.   FTP
    ii.   HTML
    iii.   XML
    iv.   WWW
c. Write one advantage of BUS topology as compared to STAR topology.   **(1)**
d. ABC SWITCHEARS LTD in srinagar is setting up the network between its different departments located in different wings. There are 4 wings named as Manufacturing (M), Research (R), Administration (A) and Personnel (P).
Distances between various wings are given below:

Wing A to Wing M	100 m
Wing A to Wing R	200 m
Wing A to Wing P	400 m
Wing M to Wing R	300 m
Wing M to Wing P	100m
Wing R to Wing P	450 m

e. **Number of Computers:**

Wing M	15
Wing R	100
Wing A	50
Wing P	150

    i.   Suggest a suitable Topology for networking the computers of all wings.   **(1)**
    ii.   Name the wing where the Server is 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)**