

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"), S1, S2;  
    S1.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;    }
```

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

Q. 3.

- 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		5	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 MATI3OII10J 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. void main( ) **(1)**
- ```
{
    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**

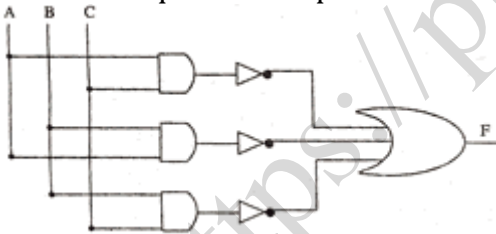
| ID  | BASIC | ALLOWANCE | CONSULTATION |
|-----|-------|-----------|--------------|
| 101 | 12000 | 1000      | 300          |

|     |       |      |     |
|-----|-------|------|-----|
| 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)  
 $F(P, Q, R, S) = \sum (0,3,5,6,7,11,12,15)$

**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), Journalism (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 to 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)**