CLASS: XII

COMPUTER SCIENCE

Time allowed : 3 hrs **M . Marks: 70**

General Instructions:

All the questions are compulsory.
Programming Language: C++
Please write down the serial number of the question before attempting it.

1. a) What is the difference between Auto variables and Static variables? Give an example to illustrate the same. [2]

b) Write the name of the header files to which the following built – in functions belong:
i) getc() ii) isalnum() [1]

c) Rewrite the following program after removing all the error(s), if any: Underline each correction. [2]

```
include<iostream.h>
#define MAX 10
void main()
    {
        int AY[MAX]=(5,10,15,20,25);
        const int loop 5;
        for[int m=0; m<loop,m++]
        switch(m):
            {
                case 0:
                case 4: cout<<AY[m]*5
                case 2:
                case 1 cout>>AY[m]>>endl;
            }
    }
```

d) Observe the following program RANDNUM.CPP carefully. If the value of VAL entered by the user is 10, choose the correct possible output(s) from the options from i) to iv) and justify your option. [2]

```
//program RANDNUM.CPP
#include<iostream.h>
```

```
#include<stdlib.h>
#include<time.h>
void main()
{
        randomize();
        int VAL, Rnd; int n=1;
        cin>>VAL;
        Rnd=8 + random(VAL) * 1;
                                    1
        while(n<=Rnd)
        {
                cout<<n<< "\t";
                n++;
        }
}
```

output options:

i) 1 2 3 4 5 6 7 8 9 10 11 12 13

ii) 0 1 2 3

iii) 1 2 3 4 5

iv) 1 2 3 4 5 6 7 8

e) What will be the output of the following program: [3]

```
#include<iostream.h>
#include<ctype.h>
#include<conio.h>
#include<string.h>
void PointersFun(char Text[], int &count)
{
        char *ptr=Text;
        int length=strlen(Text);
        for(; count<length-2; count+=2, ptr++)
        {
                *(ptr + count) = toupper( * (ptr + count) );
        }
}
void main()
{
        clrscr();
```

```
        int position=0;
        char Data[]= "ChangeString";
        PointersFun(Data, position);
        cout<<Data<< "@"<< position;
        cout.write(Data + 3, 4);
    }
```

f) Find the output of the following program: [2]

```
#include<iostream.h>
#include<conio.h>
#include<string.h>
struct KEY
        {
            char word[10];
            int count;
        };
void changekeyword(KEY somekey);
```



```
void main()
{
    KEY aKEY;
    strcpy(aKEY.word, "#define");
    aKEY.count=0;
    changekeyword(aKEY);
    cout<<aKEY.word<< "\t"<<aKEY.count<< "\n";
    getch();
}
void changekeyword(KEY somekey)
{
    strcpy(somekey.word, "const");
    somekey.count=1;
    cout<<somekey.word<< "\t" <<somekey.count<< "\n";
}
```

2. a) Why do you think function overloading must be a part of an object oriented program? [2]

b)
```
class cat
    {
    public:
        cat(int initialAge)
        {
        itsAge=initialAge;
        }
        ~cat()
        {
        }
        int getAge()
        {
        return itsAge;
        }
        void setAge(int Age)
        {
        itsAge=Age;
        }
        void Meow()
        {
        cout<< "Meow\n";
        }
    private:
        int itsAge;
    };
```



```
void main()
{
    cat Friskey(5);
    _____ //Statement 1
    cout<< "Friskey is a cat who is";
    cout<<_____ << "years old\n"; //Statement 2
    _____ //Statement 3
    Friskey.setAge(7);
```

```
        cout<< "\n Now Friskey is";
        cout<<_____ << "years old\n"; //Statement 4
    }
```

Observe the program given above carefully and fill the blanks marked as Statement 1, Statement 2, Statement 3 and Statement 4 to produce the following output: [2]

```
Meow
Friskey is a cat who is 5 years old
Meow
Now Friskey is 7 years old
```

c) Define a class ELECTION in C++ with the following descriptions:

Private members:

Name	25 characters
Age	integer
Address	30 characters
Symbol	1 character

Public members:

A function Newcontestant() which allows the user to enter Name, Age, Address and call the Assignsymbol() function to assign a symbol.

A function Assignsymbol(), which assign the the value for Symbol as per the following conditions:

Age	Symbol
<18 or >60	0
>=18 and <=40	1
>40 and <=60	2

A function Showelection() to display the content from all data members on screen. [4]

d) Answer the questions (i) to (iv) based on the following code: [4]

```
class vehicle
        {
        int wheels;
        protected:
                int passenger;
```

```
        public:
            void inputdata();
            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();
                void displaydata();
        };
```

i) Name the base class and derived class of heavyvehicle class.
ii) Name the data member(s) that can be accessed from the function displaydata().
iii) How many bytes will be required by an object of vehicle and heavyvehicle classes respectively?
iv) Is the member function outputdata() accessible to the objects of the class heavyvehicle?

3. a) Write a function that reads 10 integers into the array A. Use another integer array P of same size to store each index of the array A in the following way:
The index of the first smallest element in A is stored at index 0(zero) of P, the index of the next smallest element in A is stored at index 1(one) of P, and so on. Print the elements of A ordered in the sequence given by each succeeding index stored in P.[3]
b) If an array B[11][8] is stored as column wise and B[2][2] is stored at 1024 and B[3][3] at 1084. Find out the base address, size of an element and address of B[5]3]. [4]
c) Give the necessary declarations and define a function to push an element into the linked stack. Assume the stack contain floating numbers. [4]

d) Write a function to find the maximum and minimum value stored in a two dimensional array of size M X N. [3]

e) Evaluate the following postfix expression using a stack and show the contents of the stack after the execution of each operation. [2]

TRUE, FALSE, TRUE, FALSE, NOT, OR, TRUE, OR, OR, AND

4. a) Observe the program segment given below carefully and fill the blanks marked as Statement 1 and Statement 2 using seekg() and write() for performing the required task.

```
#include<iostream.h>
#include<fstream.h>
```

5

```
class customer
        {
        char name[40];
        long int phone;
        public:
        void search_phone(int recno); // Searching of telephone
                                      // number for a given record number
        void modify(int recno); // Function to modify the phone number
                                //  of a given record number
        };
void customer::search_phone(int recno)
{
fstream fin;
fin.open("CUST.DAT", ios::binary | ios:: in);
_____  //Statement 1
fin.read( ( char *) this, sizeof(customer));
cout<<name<< "\t" <<phone<<endl;
fin.close();
}
void customer::modify(int recno)
{
fstream fout;
fout.open( "CUST.DAT", ios::binary | ios::in | ios::out);
cout<< "Enter the new phone number";
cin>>phone;
```

```
fout.seekp(recno * sizeof(customer));
_____  //Statement 2
fout.close();
}
```
[1]

b) Write a function in C++ to read one character at a time from an existing text file named as OLD.TXT and store it into another text file named as NEW.TXT in uppercase. [2]

c) Assuming a binary file JOKES.DAT is containing objects belonging to a class JOKE (as defined below). Write an user defined function in C++ to add more objects belonging to class JOKE at the bottom of it. [3]

```
class JOKE
        {
        int jokeid;          //Joke identification number
        char type[5];        //Joke Type
        char jokedesc[255];  //Joke description
        public:
        void  Newjokeentry()
        {
        cin>>jokeid;
        gets(type);
        gets(jokedesc);
        }
```



```
        void Showjoke()
        {
        cout<<jokeid<< ";"<<type<< "\n";
        cout<<jokedesc;
        }
        };
```

5.a) Define the following terms: [2]

i) Degree of a relation
ii) Candidate Key
iii) Touple
iv) View

b) Consider the following tables SCHOOL and ADMIN. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii). [6]

SCHOOL

CODE	TEACHERNAME	SUBJECT	DOJ	PERIODS	EXPERIENCE
1001	RAVI SHANKAR	ENGLISH	12/03/2000	24	10
1009	PRIYA RAI	PHYSICS	03/09/1998	26	12
1203	LISA ANAND	ENGLISH	09/04/2000	27	5
1045	YASHRAJ	MATHS	24/08/2000	24	15
1123	GANAN	PHYSICS	16/07/1999	28	3
1167	HARISH B	CHEMISTRY	19/10/1999	27	5
1215	UMESH	PHYSICS	11/05/1998	22	16

ADMIN

CODE	GENDER	DESIGNATION
1001	MALE	VICE PRINCIPAL
1009	FEMALE	COORDINATOR
1203	FEMALE	COORDINATOR
1045	MALE	HOD
1123	MALE	SENIOR TEACHER
1167	MALE	SENIOR TEACHER
1215	MALE	HOD

i) To display TEACHERNAME, PERIODS of all teachers whose periods less than 25.
ii) To display TEACHERNAME, CODE and DESIGNATION from tables SCHOOL and ADMIN.
iii) To display the TEACHERNAME who have minimum PERIODS.
iv) To display CODE, TEACHERNAME and SUBJECT of all teachers who have joined the school after 01/01/1999.
v) SELECT MAX(EXPERIENCE), SUBJECT FROM SCHOOL GROUP BY SUBJECT;

vi) SELECT TEACHERNAME, GENDER
FROM SCHOOL, ADMIN
WHERE DESIGNATION = 'COORDINATOR' AND
SCHOOL.CODE=ADMIN.CODE ;

vii) SELECT DESIGNATION, COUNT(*) FROM ADMIN
GROUP BY DESIGNATION HAVING COUNT(*) <3;
viii) SELECT COUNT(DISTINCT SUBJECT) FROM SCHOOL;

6. a) Prove algebraically XY + YZ + Y'Z = XY + Z [2]
b) Design a circuit for the Boolean expression (A' + B' + C') (A + B' + C') (A + B + C') using NOR to NOR logic. [2]
c) Write the POS form of a Boolean function F(X, Y, Z), and the truth table of which is given below: [1]

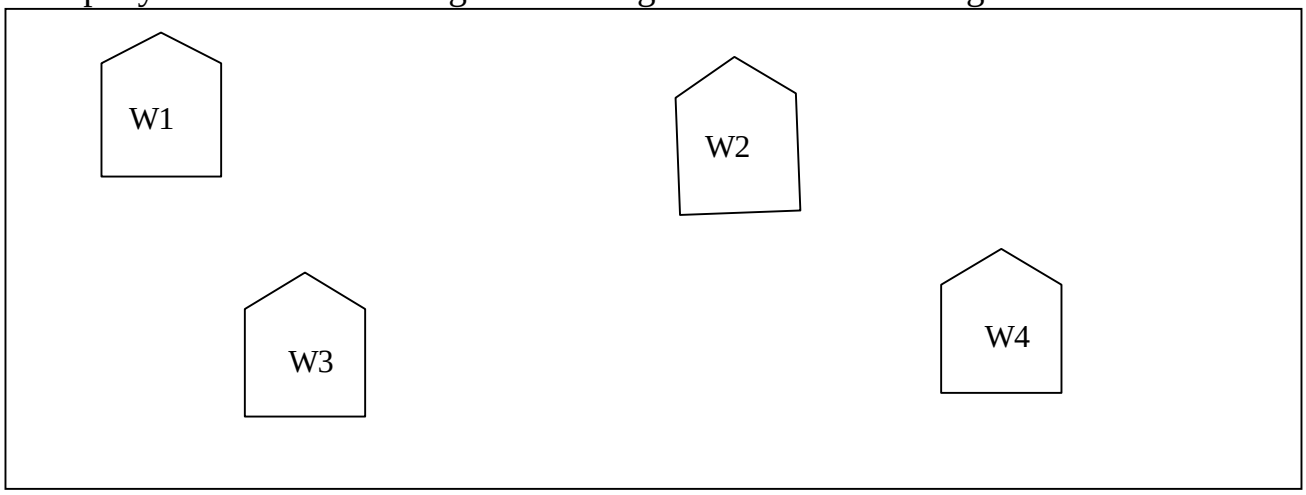
X	Y	Z	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

d) Reduce the following Boolean expression using K-map: [3]
F(W, X, Y, Z) = ∏(0, 1, 3, 5, 6, 7, 10, 14, 15)

7. a) Compare Twisted pair and coaxial transmission media. [1]
b) Expand the following terminologies: [1]
i) URL
ii) NFS
c) What is web browser? [1]
d) What do you understand by network security? [1]

8

e) A company in Oman has 4 wings of buildings as shown in the diagram:



Center to center distances between various Buildings:

W3 to W1	50m
W1 to W2	60m
W2 to W4	25m
W4 to W3	170m
W3 to W2	125m
W1 to w4	90m

Number of computers in each of the wing:

W1	150
W2	15
W3	15
W4	25

Computers in each wing are networked but wings are not networked. The company has now decided to connect the wings also.

i) Suggest a most suitable cable layout of the connection between the wings. [1]

ii) Suggest the most suitable wing to house the server of this company with a suitable reason. [1]

iii) Suggest the placement of the following devices with justification: [1]

1) Internet connecting device/modem
2) Switch / Hub

iv) The company is planning to link its head office situated in India with the offices at Oman. Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer. [1]