CLASS - XII
SUBJECT – COMPUTER SCIENCE

Max Marks : 70 **Time Allowed: 3Hours**

Instructions : 1. All questions are compulsory. 2. Programming language : C++

1a) Differentiate between overloaded functions and function with default arguments. Also give suitable example in C++. 2

1b) Write the related C++ library function which can do the required task. Also mention header file(s)? 1

(i) This function helps to place the cursor at a specific position on the screen

(ii) To terminate the program

1c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2

```
# include (iostream.h)
class XYZ
{
  char Q, R;
public :
  Showdata()
  {
    cout << Q << R << endl;
  }
};
void getdata()
{
  cin << Q << R;
}
void main()
{   xyz T, M ;
   T.getdata();
   showdata();
   M = T;
   M.Q += 2;
   showdata();
}
```

1d) Study the following program and select the possible output(s) from it: 2

```
#include <iostream.h>
#include <stdlib.h>
void main()
{   randomize();
   int guess , high = 4;
   guess = random (high ) + 50;
   for(int C = guess; C<=55; C++ )
   cout << C << " $ ";
}
```

(i) 50 $ 51 $ 52 $ 53 $ 54 $ 55 $

(ii) 52 $ 53 $ 54 $ 55 $
(iii) 53 $ 54 $
(iv) 50 $ 51 $ 52 $ 53 $ 54 $ 55

1e) **Find the output of the following program:** 2

```
#include<iostream.h>
#include<ctype.h>
void Encode(char Text[ ])
{
for(int C=0;Text[C]!='\0';C++)
{
char CH=(Text[C]>='a'&&Text[C]<='z')?Text[C]-32:Text[C];
if(CH<='K'&&CH>='A')
Text[C]='$';
else if(CH=='E'||CH=='I'||CH=='M')
Text[C]=Text[C]+32;
else if(CH>='5'&&CH<='8')
Text[C]='&';
else if (CH>='a'&&CH<='z')
Text[C]=toupper(CH);
else
Text[C]='*';
}
}
void main()
{
char Choice[] = "naVoDAya359NeW";
cout<<endl<<endl;
Encode(Choice);
cout<<Choice<<endl;
}
```

1 f) Find the output of the following program 3

```
#include<iostream.h>
void main()
      {     int A[]={12,18,20, 35,40};
int *p=A;
while(*p<30)
{
if(*p%3!=0)
*p=*p+5;
else
*p=*p+2;
p++;
}
for(int j=0;j<=4;j++)
{
cout<<A[j]<<"*";
if(j%3==0)
cout<<endl; }
cout<<A[4]*3<<endl; }
```

2a) Differentiate between members which are present within the private and protected visibility mode with those which are present within the public visibility mode. 2

2b) Answer the questions (i) and (ii) after going through the following class: 2

```
class student
{   int rno;
    char name[20];
    float  fees;
public:
    student()                    // function 1
    {   rno = 1;
        strcpy(name, "XYZ");
        Fees = 2000;
    }
    void display()               // function 2
    {   cout << rno << name << fees;
    }
    ~student()                   // function 3
    {    cout << " end of object";
    }
    Student(int r, char *n, float f )  // function 4
};
```

(i) What OOPS property do function 1 and function 4 depict? Write definition for function 4.

(ii) What is the difference between the following statements

```
student  T(10,"PQR",3000);
student  P  = student ( 10,"PQR",3000);
```

2c) Define a class iptl in C++ with following descriptions: 4

Private members:

- Team name string
- Matches played int
- Matches Won int
- Matches Draw int
- Category char

Public members:

- A function getdetails() to input all the above fields.
- A private function assigncat() to assign category on the following criteria
  - ✓ Category A If the matches won are more than 80% of matches played
  - ✓ Category B If the matches won are more than 50% but less than 80% of matches played
  - ✓ Category C If the matches won are less than 50% of matches played
- A function showdetails() to display the above fields alongwith the no. of matches lost by the team

2d) Consider the following declarations and answer the questions given below: 4

```
class sports
{
  char categ;
  char name[30];
public:
  sports(){};
```

```
  void enterdetails();
  void showdetails();
};
class club: public sports
{
protected:
  char player_name[30];
  char player_address[50];
public:
  long fees;
  club() {};
  void enterclubdetails();
  void showclubdetails();
};
class tennisclub: protected club
{
  int facility;
  char f_name[20];
public:
  tennisclub(){};
  void entertennisdetails();
  void showtennisdetails();
};
```

(i) Which type of inheritance is illustrated in the above example.
(ii) How many bytes are required for an object of class tennisclub?
(iii) Write the names of all data members that can be accessed from members of class tennisclub.
(iv) Write the names of all members that can be accessed from objects of class tennisclub.

3a) An array M[20][10] is stored in the memory column wise with each element occupying 4 bytes of memory. Find out the base address and the address of element MAT[10][8], if the location of MAT[15][5] is 8000. 3

3b) Write a function in C++ which accepts a 2-D array and it size and prints the no. of positive and negative numbers in each row. 2

3c) Write a function in C++ which accepts an integer array and its size as arguments / parameters and arrange all the odd numbers in the first row and even numbers in the second row of a 2-D array. The unused cells of the 2-D array must be filled with 0. 3

Eg:

If the array is 1,2,3,4,5,6

The resultant 2-D array should be

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

3d) Evaluate the following postfix expression using a stack and show the contents of the stack after each operation. 2

25 , 3 , 2 , + , / , 7 , + , 4 , *

3e) Write a function in C++ to POP the element from a dynamically allocated stack where each node contains an integer as data. Assume the following 4

definition of NODE

```
struct NODE
{
   int number;
   NODE *next;
};
```

4a) Write the C++ command which will help to move the file pointer at the beginning of the second last record in a binary file named ABC.DAT storing objects of class PROP. The file has been opened for reading only. 1

4b) Write a C++ program to count the no. of words with the occurrence **'THIS'** in a text file "BOOK.DAT". 2

4c) Given a binary file MPLX.dat, containing records of the following type: 3

```
class multiplex
{
   int  audinum;
   char movie[50];
   int num_of_shows;
public:
   void get();  // to enter the above fields
   void show(); // to display the above fields
   char *retmovie()
   { return movie;
   } };
```

Write a function in C++ that would read contents from the file MPLX.DAT and displays the auditorium number and no. of shows of the movie named "IRONMAN".

5a) What do you understand by the terms Candidate key and Cardinality of a relation? 2

5b) Consider the following tables EMPLOYEES and EMPSALARY. Write SQL commands for the 6
Statements (i) to (iv) and give outputs for SQL queries (v) to (viii).

EMPLOYEES

EMPID	FIRSTNAME	LASTNAME	ADDRESS	CITY
010	George	Smith	83 First Street	Howard
105	Mary	Jones	842 Vine Ave	Loasantiville
152	Sam	Tones	33 Elm St	Paris
215	Sarah	Acherman	440 US 110	Upton
244	Manila	Sengupta	24 Friends Street	New Delhi
300	Robert	Samuel	9 Fifth Cross	Washington
335	Henry	Williams	12 Moore Street	Boston
400	Rachel	Lee	121 Harrison St	New York
441	Peter	Thompson	11 Red Road	Paris

EMPSALARY

EMPID	SALARY	BENEFITS	DESIGNATION
010	75000	15000	Manager
105	65000	15000	Manager
152	80000	25000	Director
215	75000	12500	Manager
244	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman
441	28000	7500	Salesman

(i) To display Firstname and Lastname of all employees living in Paris from the table
EMPLOYEES.
(ii) To display the content of EMPLOYEES table in alphabetical order of CITY.
(iii) To display the Firstname , Lastname, and total salary of all Managers from the
Tables EMPLOYEES and EMPSALARY, where total salary is calculated as SALARY + BENEFITS
(iv) Display details of all employees whose Firstname begins with 'S'.

(v) SELECT FIRSTNAME,SALARY FROM EMPLOYEES, EMPSALARY WHERE DESIGNATION ='Manager' AND EMPLOYEES.EMPID =EMPSALARY.EMPID;
(vi) SELECT COUNT(DISTINCT CITY) FROM EMPLOYEES;
(vii) SELECT DESIGNATION,SUM(SALARY) FROM EMPSALARY GROUP BY DESIGNATION HAVING COUNT(*)>2;
(viii) SELECT SUM(SALARY) FROM EMPSALARY WHERE DESIGNATION='Clerk';

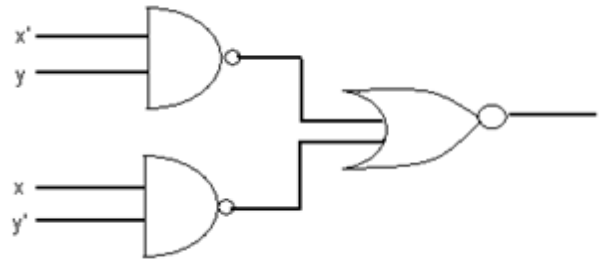
6a) State and prove DeMorgan's theorem with example. 2

6b) If F(A,B,C,D) = Σ(0,1,2,4,5,6,8,10). Obtain the simplified form using K-Map. 3

6c) Write the canonical SOP form for the given expression 1

X	Y	Z	P
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

6d) Write the equivalent Boolean expression for the following Circuit 2



7a) Expand CDMA and FTP. 2

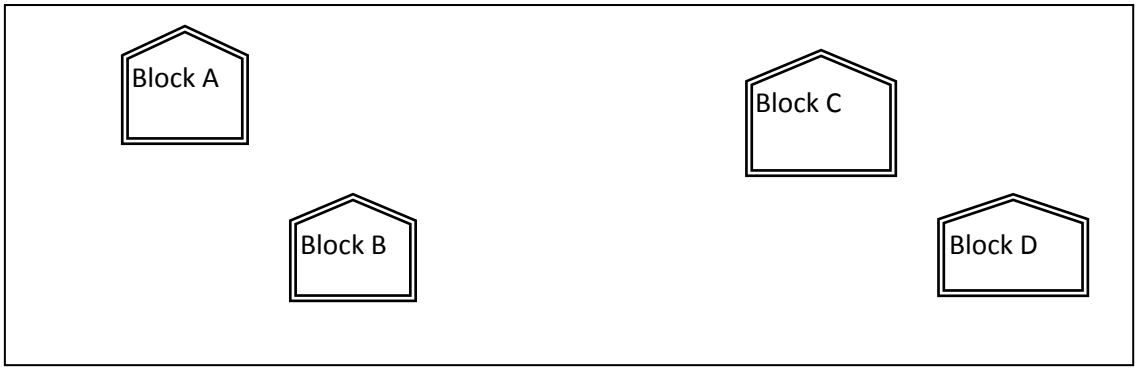
7b) What are the benefits of 3G? 1

7c) Write two advantages of optical fiber cables. 1

7d) Differentiate between PAN and MAN. 1

7e) What are Intellectual Property Rights (IPR) ? 1

7 f) Knowledge Supplement Organisation has set up its new center at Mangalore for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below : 4



Center to center distances between various blocks

Black A to	50 m
Block B to	150 m
Block C to	25 m
Block A to	170 m
Block B to	125 m
Block A to	90 m

Number of Computers

Block A	25
Block B	50
Block C	125
Block D	10

(i) Suggest a cable layout of connections between the blocks.

(ii) Suggest the most suitable place (i.e. block) to house the server of this organisation with a suitable reason

iii) Suggest the placement of the following devices with justification
i) Hub/Switch ii) Repeater

iv) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed?