SECOND TERM EXAMINATION, 2011–2012
COMPUTER SCIENCE (083)

Time Allowed : 3 hrs.

CLASS–XII

M.M. : 70

General Instructions :
(i) All questions are compulsory.
(ii) Programming Language is C++.

1. Answer the following questions:
(a) Illustrate the use of inline function in C++ with the help of an example. (1)
(b) What is this pointer? Give an example to illustrate the use of it in C++. (2)
(c) Name the header files that shall be required for successful compilation of the
following C++ program:

```cpp
main()
{
    char str[20];
    cout<fabs(-34.776);
    cout<<"n Enter a string: ";
    cin.getline(str,20);
    return 0; }
```

(d) Rewrite the following program after removing all the syntactical errors underlining
each correction. (if any)

```cpp
#include<iostream.h>
#include<stdio.h>
#include<string.h>

class club
{
    int memnum=23;
    char mname[30];
    char mtype[ ];
    public:
    void inclub( )
    {
        cin>memnum>mname>mtype; }
    void outclub( )
    {
        cout<<memnum<<mname<<mtype<<endl; }
};

void main( )
{ club p1,"p2;
```

P.T.O.
(e) Find the output of the following program segment (Assuming that all required header files are included in the program):

```c
void FUNC(int *a, int n)
{
    int i, j, temp, sm, pos;
    for (i = 0; i < n/2; i++)
        for (j = 0; j < (n/2)-1; j++)
            if (*a + j > *(a + j + 1))
                { temp = *(a + j);
                  *(a + j) = *(a + j + 1);
                  *(a + j + 1) = temp; }
    for (i = n - 1; i >= n/2; i--)
        { sm = *(a + i);
          pos = i;
          for (j = i - 1; j >= n/2; j--)
              if (*a + j < sm)
                  { pos = j;
                    sm = *(a + j); }
        temp = *(a + i);
        *(a + i) = *(a + pos);
        *(a + pos) = temp; }
}
```

(f) Observe the following program TEST.CPP carefully. If the value of Disp entered by the user is 22, choose the correct possible output(s) from the options from (i) to (iv), and justify your option.

```c
//program: TEST.CPP
#include <stdlib.h>
#include <iostream.h>
void main( )
{
    int w[] = {-4, 6, 1, -8, 19, 5}, i;
    FUNC(w, 6);
    for (i = 0; i < 6; i++)
        cout << w[i] << " ";
```
(randomize( );
int Disp,Rnd;
cin>>Disp;
Rnd=random(Disp)+15;
for(int N=1;i<=3;i<=Rnd; i+=4,N++)
cout<<N<<" ";
}

Output Options :
(i) 1 2 3 4
(ii) 1 2
(iii) 1 2
(iv) 1 2 3

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

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

class Match
{
int Time;
public:
Match() //Function 1
{
    Time=0;
cout="Match commences"<<end1;
}
void Details() //Function 2
{
cout="Inter Section Basketball Match"<<end1;
}
Match(int Duration) //Function 3
{
    Time=Duration;
cout="Another Match begins now"<<end1;
}
Match(Match &M) //Function 4
{
    .........
}
};
(i) Which category does Function 4 belong to and what is the purpose of using it?
(ii) Complete the definition of function 4.
(iii) Write statements that would call the member Functions 4
(iv) Which category does Function 2 belong to and when does it get executed?
(v) Write statements that would call the member Functions 3.
(c) Define a class named Cricket in C++ with the following descriptions:

private members
Target_score int
Overs_bowled int
Extra_time int
Penalty int

cal_penalty() a member function to calculate penalty as follows:
if Extra_time 10, penalty = 1
if Extra_time>10 but<=20, penalty = 2,
otherwise, penalty = 5

public members
- a function extradata() to allow the user to enter values for target_score,
  overs_bowled, extra_time and calculate penalty on its own.
- a function dispdata() to allow the user to view the contents of all data
  members.

(d) Answer the questions (i) to (viii) based on the following code:

Class Medicines
{
    char Category[10];
    char Dateofmanufacture[10];
    char Company[20];
    protected:
    char steroids;
    public:
    Medicines();
    void entermedicinedetails();
    void showmedicinedetails();
};
class Capsules : private Medicines
{
    protected:
    char capsulename[30];
class Antibiotics : public Capsules
{
    int Dosageunits;
    char sideeffects[20];
    int Usewithdays;
    public:
    Antibiotics();
    void enterdetails();
    void showdetails();
} obj;

(i) Which type of inheritance is depicted in the above example?
(ii) How many bytes will be required by an object of class Medicines and an object of class Antibiotics respectively?
(iii) Write names of all the member functions accessible from the class Antibiotics.
(iv) Write names of all the member functions accessible from member functions of class Capsules.
(v) Write names of all the data members which are accessible from objects of class Antibiotics.
(vi) Can the following statement be given in enterdetails() function, give reason for your answer:
    steroids=1;
(vii) What will be the sequence in which the constructors are executed when obj is created?
(viii) What will happen, if the constructor is defined in the protected section of class medicine?

3. (a) Define function stackpush() to insert nodes and stackpop() to delete nodes, for a linklist implemented stack having the following structure for each node : (3)
struct Node
{
    char name[20];
    int age;

(5 com)
Node *Link;
};
class STACK
{
    Node * Top;
    Public :
    STACK( ) { Top=NULL;}
    void stackpush( );
    void stackpop( );
    ~STACK( );
};

(b) Assume an array A containing elements of structure Teacher is required to be arranged in Descending order of salary. Write a C++ program to arrange the same with the help of selection sort. The array and its size is required to be passed as parameters to the functions. Definition of structure Teacher is as under:

struct Teacher
{
    int ID;
    char Teacher_name[25];
    float Salary;
};

(c) Given an array named A with following elements 3,-5,1,3,7,0,-15,3,-7,-8. Write a C++ function to shift all the negative numbers to left so that the resultant array may look like -5,-15,-7,-8,3,1,3,7,0,3.

(d) An array S[40][30] is stored in the memory along the row with each of the element occupying 2 bytes, find out the memory location for the element S[15][5], if an element s[20][10] is stored at memory location 4400.

(e) 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 (size must be odd).

If the array is 1 2 3 4 5
The output must be

1 10 0 0 5
0 2 0 4 0
0 0 3 0 0
0 2 0 4 0
1 0 0 5

If the array is 10 15 20
The output must be

10 0 20
0 15 0
10 0 20
(f) Evaluate the following postfix notation of expression using stack:
A+B*(P+Q)*C/D.

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

#include <fstream.h>
class Item
{
    int lnno; char Item[20];
    public:
        //Function to search and display the content from a particular record
        //number
        void Search (int);
        //Function to modify the content of a particular record number
        void Modify(int);
};

void Item :: Search (int RecNo)
{
    ifstream File;
    File.open("STOCK.DAT", ios :: binary | ios :: in);
    File.read((char*)this , sizeof(Item));
    cout << "lnno = " << lnno << endl;
    File.close ( );
}

void Item :: Modify (int RecNo)
{
    ifstream File;
    File.open("STOCK.DAT", ios ::binary | ios :: in | ios :: out);
    cin>>lnno;
    cout.wait(1m,20);
    File.write ((char*) this, sizeof(Item));
    File.close ( );
}

(b) Write a program to read a text file “TEXT.DOC”. Transfer the lines that start with a vowel (not case sensitive) to the file in reverse order to a new file
“EXAM.DOC”. Merge the content of both the files into a third file “FINAL.DOC”, contents of “TEXT.DOC” followed by “EXAM.DOC.” Also find the total number of bytes occupied by the file.

3. Write a function in c++ to read and display the records of computers that cost more than Rs. 20000 from the binary file “COMP.DAT”, assuming that the binary file is containing the objects of the following class:

```c++
class COMPUTER
{
    int sno;
    char model[25];
    float price;

    public:
    float Retpr() { return price; }
    void Enter() { cin >> sno >> price; gets(model); }
    void Display() { cout << sno << Name << price << endl; }
};
```

2. What do you mean by degree & cardinality of a relation? Explain with example.

2. Consider the following tables BOOKS and ISSUED. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii).

Note: The new record should not be taken into account for finding the output of the queries.

### BOOKS

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<th>Book_Name</th>
<th>Author_Name</th>
<th>Publishers</th>
<th>Price</th>
<th>Type</th>
<th>Qty</th>
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</thead>
<tbody>
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<td>C01</td>
<td>Fast Cook</td>
<td>Lata Kapoor</td>
<td>EPB</td>
<td>355</td>
<td>Cookery</td>
<td>5</td>
</tr>
<tr>
<td>F01</td>
<td>The Tears</td>
<td>William Hopkins</td>
<td>First</td>
<td>650</td>
<td>Fiction</td>
<td>20</td>
</tr>
<tr>
<td>T01</td>
<td>My C++</td>
<td>Brain &amp; Brooke</td>
<td>FPB</td>
<td>350</td>
<td>Text</td>
<td>10</td>
</tr>
<tr>
<td>T02</td>
<td>C++ Brain</td>
<td>A.W. Rossaine</td>
<td>TDH</td>
<td>350</td>
<td>Text</td>
<td>15</td>
</tr>
<tr>
<td>F02</td>
<td>Thunderbolts</td>
<td>Anna Roberts</td>
<td>First</td>
<td>750</td>
<td>Fiction</td>
<td>50</td>
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</table>

### ISSUED

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<tr>
<td>C01</td>
<td>5</td>
</tr>
<tr>
<td>F01</td>
<td>2</td>
</tr>
<tr>
<td>C01</td>
<td>6</td>
</tr>
<tr>
<td>T02</td>
<td>3</td>
</tr>
</tbody>
</table>

(i) To list the names from books of Text type;
(ii) To display the names and price from books in ascending order of their price;
(iii) To increase the price of all books of EPB publishers by 50; \(1\)
(iv) To display the average price of books publisher wise; \(1\)
(v) Insert a new record in books table with any value of your choice; \(1\)
(vi) Select max(price) from books; \(\frac{1}{2}\)
(vii) Select count(DISTINCT Publishers) from books where Price>=400; \(\frac{1}{2}\)
(viii) Select Book_Name, Author_Name from books where Publishers = 'First'; \(\frac{1}{2}\)
(ix) Select min(Price) from books where type = 'Text'. \(\frac{1}{2}\)

6. (a) State and verify the De Morgan's law using Algebraic method. \(1\)
(b) State and verify Distributive law using truth table. \(1\)
(c) Convert the following Boolean expression into its equivalent Canonical Product of Sum form (POS): \(XYZ+XYZ'+X'YZ'+X'Y'Z'\). \(2\)
(d) Design a circuit for the Boolean expression:
\((A' + B' + C')(A + B' + C')(A + B + C')\) using NOR to NOR logic. \(1\)
(e) Reduce the following Boolean Expression using K-Map
\[ F(A, B, C, D) = \Sigma (0, 3, 4, 5, 6, 7, 8, 10, 12, 15) \] \(3\)