SAMPLE PAPER – SET II
COMPUTER SCIENCE [CODE–083]
CLASS – XII

Max Time : 3 hours
Max Marks : 70

1. (a) What is the difference between Actual Parameter and Formal Parameters? Also, give a suitable C++ code to illustrate both.
(b) Write the names of the header files to which the following belong:
   (i) exp()  
   (ii) strcmpi()
(c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction.
   
   ```cpp
   #include <iostream.h>
   struct Pixels
   { int Color,Style; }
   void ShowPoint(Pixels P)
   { cout << P.Color,PStyle << endl; }
   void main()
   {
     Pixels Point1=(5,3);
     ShowPoint(Point1);
     Pixels Point2=Point1;
     Color.Point1+=2;
     ShowPoint(Point2);
   }
   ```
   (d) Find the output of the following program:
   
   ```cpp
   #include <iostream.h>
   void Changethecontent(int Arr[], int Count)
   {
     for (int C=1,C<Count;C++)
       Arr[C-1]=Arr[C];
   }
   void main()
   {
     int A[]={3,4,5},B[]={10,20,30,40},C[]={900,1200};
     Changethecontent(A,3);
     Changethecontent(B,4);
     Changethecontent(C,2);
     for (int L=0,L<3;L++) cout << A[L] << '#';
   }
   ```
(e) Find the output of the following program:

```
#include <iostream.h>

struct Game {
    char Magic[20];
    int Score;
};

void main()
{
    Game M = {"Tiger", 500};
    char *Choice;
    Choice = M.Magic;
    Choice[4] = 'P';
    Choice[2] = 'L';
    M.Score += 50;
    cout << M.Magic << M.Score << endl;
    Game N = M;
    N.Score = 120;
    cout << N.Magic << N.Score << endl;
}
```

(f) In the following program, if the value of N given by the user is 20, what maximum and minimum values the program could possibly display?

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

void main()
{
    int N, Guessnum;
    randomize();
    cin >> N;
    Guessnum = random(N-10) + 10;
    cout << Guessnum << endl;
}
```

2. (a) What do you understand by Polymorphism? Give a suitable example of the same. 2
(b) Answer the questions (i) and (ii) after going through the following program:
```c
class Match
```
{ int Time;

public:

    Match() //Function 1
    {
        Time = 0;
        cout << "Match commences" << endl;
    }

    void Details() //Function 2
    {
        cout << "Inter Section Basketball Match" << endl;
    }

    Match(int Duration) //Function 3
    {
        Time = Duration;
        cout << "Another Match begins now" << endl;
    }

    Match(Match &M) //Function 4
    {
        Time = M.Duration;
        cout << "Like Previous Match " << endl;
    }
};

i) Which category of constructor - Function 4 belongs to and what is the purpose of using it?

ii) Write statements that would call the member Functions 1 and 3

(c) Define a class in C++ with following description:

Private Members
- A data member Flight number of type integer
- A data member Destination of type string
- A data member Distance of type float
- A data member Fuel of type float
- A member function CALFUEL() to calculate the value of Fuel as per the following criteria

<table>
<thead>
<tr>
<th>Distance</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=1000</td>
<td>500</td>
</tr>
<tr>
<td>more than 1000</td>
<td>1100</td>
</tr>
<tr>
<td>more than 2000</td>
<td>2200</td>
</tr>
</tbody>
</table>

Public Members
- A function FEEDINFO() to allow user to enter values for Flight Number, Destination
tion, Distance & call function CALFUEL() to calculate the quantity of Fuel.
• A function SHOWINFO() to allow user to view the content of all the data members.

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

```c++
class CUSTOMER
{
    int Cust_no;
    char Cust_Name[20];
protected:
    void Register();
public:
    CUSTOMER();
    void Status();
};
class SALESMAN
{
    int Salesman_no;
    char Salesman_Name[20];
protected:
    float Salary;
public:
    SALESMAN();
    void Enter();
    void Show();
};
class SHOP : private CUSTOMER , public SALESMAN
{
    char Voucher_No[10];
    char Sales_Date[8];
public:
    SHOP();
    void Sales_Entry();
    void Sales_Detail();
};
```

(i) Write the names of data members which are accessible from objects belonging to class CUSTOMER.
(ii) Write the names of all the member functions which are accessible from objects belonging to class SALESMAN.
(iii) Write the names of all the members which are accessible from member functions of class SHOP.
(iv) How many bytes will be required by an object belonging to class SHOP?

3. (a) Write a function in C++ to combine the contents of two equi-sized arrays A and B by adding their corresponding elements as the formula A[i]+B[i]; where value i varies from 0 to N-1 and transfer the resultant content in the third same sized array C. 3
(b) An array P[20][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the Base Address of the array, if an element P[2][20] is stored at the memory location 5000. 3
(c) Write a function in C++ to perform Push operation on a dynamically allocated Stack containing real numbers. 4
(d) Write a function in C++ to find sum of each row for a two dimensional integer array having 3 rows and 4 columns which is passed as parameter of the function. 2
(e) Evaluate the following postfix notation of expression showing the stack contents for each step of evaluation:
   True, False, AND, True, True, NOT, OR, AND

4. (a) Observe the program segment given below carefully and answer the questions that follow: fill the blanks marked as Statement 1 and Statement 2 using seek() and tellg() functions for performing the required task. 1
#include <iostream.h>

class Employee
{
    int Eno;char Ename[20];
public:
    void Input() {cin >> Eno; cin.getline(Ename,20); }
    void Display() {cout << Eno << " " << Ename << endl; }
};

int Countrec()
{
    ifstream File;
    Employee E;
    File.open("EMPDAT",ios::binary|ios::in);
    /\Statement 1\n    int Bytes = ______________________  // Statement 2
    int Count = Bytes / size of (Item);
    File.close();
    return Count;
}

(i) Write statement 1 to position the file pointer to the end of the file.
(ii) Write statement 2 to return the number of bytes from the beginning of the file to the current position of the file pointer.
(b) Write a function in C++ to count the number of alphabets present in a text file "NOTES.TXT".

(c) Write a function in C++ to add new objects at the bottom of a binary file "STUDENT.DAT", assuming the binary file is containing the objects of the following class.

```c
class STUD
{
    int Rno;
    char Name[20];
public:
    void Enter(){cin >> Rno; gets(Name);}
    void Display(){cout << Rno << Name << endl;}
};
```

5. (a) What do you understand by the Union and Cartesian Product operations performed upon two relations?

Consider the following tables GAMES and PLAYER and answer (b) and (c) parts of this question:

**Table: GAMES**

<table>
<thead>
<tr>
<th>GCode</th>
<th>GameName</th>
<th>Type</th>
<th>Number</th>
<th>PrizeMoney</th>
<th>Schedule Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Carom Board</td>
<td>Indoor</td>
<td>2</td>
<td>5000</td>
<td>23-Jan-2004</td>
</tr>
<tr>
<td>102</td>
<td>Badminton</td>
<td>Outdoor</td>
<td>2</td>
<td>12000</td>
<td>12-Dec-2003</td>
</tr>
<tr>
<td>103</td>
<td>Table Tennis</td>
<td>Indoor</td>
<td>4</td>
<td>8000</td>
<td>14-Feb-2004</td>
</tr>
<tr>
<td>105</td>
<td>Chess</td>
<td>Indoor</td>
<td>2</td>
<td>9000</td>
<td>01-Jan-2004</td>
</tr>
<tr>
<td>108</td>
<td>Lawn Tennis</td>
<td>Outdoor</td>
<td>4</td>
<td>25000</td>
<td>19-Mar-2004</td>
</tr>
</tbody>
</table>

**Table: PLAYER**

<table>
<thead>
<tr>
<th>PCode</th>
<th>Name</th>
<th>Gcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nabi Ahmad</td>
<td>101</td>
</tr>
<tr>
<td>2</td>
<td>Ravi Sahai</td>
<td>108</td>
</tr>
<tr>
<td>3</td>
<td>Jatin</td>
<td>101</td>
</tr>
<tr>
<td>4</td>
<td>Nazneen</td>
<td>103</td>
</tr>
</tbody>
</table>

(b) Write SQL commands for the following statements:

(i) To display the name of all GAMES with their GCodes
(ii) To display details of those GAMES which are having PrizeMoney more than 7000.
(iii) To display the content of the GAMES table in ascending order of ScheduleDate.
(iv) To display sum of PrizeMoney for each Type of GAMES
(c) Give the output of the following SQL queries:
   (i) SELECT COUNT(DISTINCT Number) FROM GAMES;
   (ii) SELECT MAX(ScheduleDate), MIN(ScheduleDate) FROM GAMES;
   (ii) SELECT Name, GameName FROM GAMES G, PLAYER P
       WHERE G.Gcode=P.Gcode AND G.PrizeMoney>10000;
   (iv) SELECT DISTINCT Gcode FROM PLAYER;

6. (a) State and algebraically verify Absorption Laws.
   (b) Write the equivalent Boolean Expression for the following Logic Circuit

   ![Logic Circuit Diagram]

(c) Write the SOP form of a Boolean function G, which is represented in a truth table as follows:

<table>
<thead>
<tr>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
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<td>1</td>
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<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

(d) Reduce the following Boolean Expression using K-Map:

F(U,V,W,Z) = \Pi (0,1,2,4,5,6,8,10)

7. (a) Define the term Bandwidth. Give any one unit of Bandwidth.
(b) When do you prefer XML over HTML and why?
(c) How firewall protect our Network?
(d) What is the importance of URL in networking?
(e) Ravya Industries has set up its new center at Kaka Nagar for its office and web based activities. The company compound has 4 buildings as shown in the diagram below:
Center to center distances between various buildings is as follows:

<table>
<thead>
<tr>
<th>Distance</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harsh Building to Raj Building</td>
<td>50</td>
</tr>
<tr>
<td>Raj Building to Fazz Building</td>
<td>60</td>
</tr>
<tr>
<td>Fazz Building to Jazz Building</td>
<td>25</td>
</tr>
<tr>
<td>Jazz Building to Harsh Building</td>
<td>170</td>
</tr>
<tr>
<td>Harsh Building to Fazz Building</td>
<td>125</td>
</tr>
<tr>
<td>Raj Building to Jazz Building</td>
<td>90</td>
</tr>
</tbody>
</table>

Number of Computers in each of the buildings is follows:

<table>
<thead>
<tr>
<th>Building</th>
<th>Number of Computers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harsh Building</td>
<td>15</td>
</tr>
<tr>
<td>Raj Building</td>
<td>150</td>
</tr>
<tr>
<td>Fazz Building</td>
<td>15</td>
</tr>
<tr>
<td>Jazz Building</td>
<td>25</td>
</tr>
</tbody>
</table>

e1) Suggest a cable layout of connections between the buildings.
e2) Suggest the most suitable place (i.e. building) to house the server of this organisation with a suitable reason.
e3) Suggest the placement of the following devices with justification:
   (i) Internet Connecting Device/Modem
   (ii) Switch

e4) The organisation is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer.
f) Compare freeware and Shareware. 1

g) How Trojan Horses are different from Worms? Mention any one difference. 1
1. (a) What is the difference between Actual Parameter and Formal Parameters? Also, give a suitable C++ code to illustrate both. 2

Answer:

<table>
<thead>
<tr>
<th>Actual Parameter</th>
<th>Formal Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is a parameter, which is used in function call to send the value from calling environment</td>
<td>It is a parameter, which is used in function header, to receive the value from actual parameter</td>
</tr>
</tbody>
</table>

```cpp
#include <iostream.h>
void Calc(int T) // T is formal parameter
{
    cout<<5*T;
}
void main()
{
    int A=45;
    Calc(A); // A is actual parameter
}
```

(1 Mark for stating the difference)
(1 Mark for the suitable example)

OR

(Full 2 Mark for explanation of differences with the help of an example)
(1 Mark for the example)

(b) Write the names of the header files to which the following belong: 1

(i) exp() (ii) strcmp()

Answer:

(i) math.h (ii) string.h

(1½ Mark for mentioning each correct header filename)

(c) Rewrite the following program after removing the syntactical errors (if any). Underline each correction. 2
#include <iostream.h>
struct Pixels
{ int Color, Style; }
void ShowPoint(Pixels P)
{ cout<<P.Color<<P.Style<<endl; }
void main()
{
    Pixels Point1 = {5,3};
    ShowPoint(Point1);
    Pixels Point2 = Point1;
    Point1.Color += 2;
    ShowPoint(Point2);
}

Answer:
#include <iostream.h>
struct Pixels
{ int Color, Style; }
void ShowPoint(Pixels P)
{ cout<<P.Color<<P.Style<<endl; }
void main()
{
    Pixels Point1 = {5,3};
    ShowPoint(Point1);
    Pixels Point2 = Point1;
    Point1.Color += 2;
    ShowPoint(Point2);
}

(½ Mark for each correction)
(d) Find the output of the following program:
#include <iostream.h>
void Changethecontent(int Arr[], int Count)
{
    for (int C = 1; C < Count; C++)
    
    Arr[C-1] = Arr[C];
}
void main()
{
    int A[] = {3,4,5}, B[] = {10,20,30,40}, C[] = {900,1200};
    Changethecontent(A,3);
    Changethecontent(B,4);
```cpp
Changethecontent(C,2);
for (int L=0;L<3;L++) cout<<A[L]<<"#";
cout<<endl;
for (L=0;L<4;L++) cout<<B[L]<<"#";
cout<<endl;
for (L=0;L<2;L++) cout<<C[L]<<"#";
}
```

**Answer:**

```
7#9#5#
30#50#70#40#
2100#1200
```

(1 Mark for each correct line of output)

**Note:**

Deduct ½ Mark if any/all endl is/are not considered at correct place(s)
Deduct ½ Mark if any/all of the # symbol(s) is/are missing

(e) Find the output of the following program:

```cpp
#include <iostream.h>

struct Game
{
    char Magic[20];int Score;
};

void main()
{
    Game M="Tiger",500; char *Choice;
    Choice=M.Magic;
    M.Score+=50;
cout<<M.Magic<<M.Score<<endl;
    Game N=M;
    N.Score=120;
cout<<N.Magic<<N.Score<<endl;
}
```

**Answer:**

```
T!eP550
AlJp430
```

(1 Mark for each correct line of output)
Note:
Deduct ½ Mark if any/all endl is/are not considered at correct place(s)
Deduct ½ Mark if any/all of the : symbol(s) is/are missing

(f) In the following program, if the value of N given by the user is 20, what maximum and minimum values the program could possibly display? 2

```cpp
#include <iostream.h>
#include <stdlib.h>

void main()
{
    int N, Guessnum;
    randomize();
    cin >> N;
    Guessnum = random(N-10) + 10;
    cout << Guessnum << endl;
}
```

Answer:
Maximum value = 19, Minimum value = 10
(1 Mark each for correct minimum and maximum values)

2. (a) What do you understand by Polymorphism? Give a suitable example of the same. 2

Answer:
Polymorphism: It is a method of using the same operator or function (method) to work using different set of inputs. Function overloading is one of the examples of polymorphism, where more than one function carrying same name behave differently with different set of parameters passed to them.

```cpp
void Display()
{
    cout << "Hello!" << endl;
}

void Display(int N)
{
    cout << 2*N + 5 << endl;
}
```

(1 Mark for appropriate definition)
(1 Mark for appropriate example)

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

```cpp
class Match
{
    int Time;

public:
    Match() //Function 1
```
{ 
    Time=0; 
    cout<< "Match commences"<<endl; 
} 

void Details() //Function 2 
{ 
    cout<<"Inter Section Basketball Match"<<endl; 
}

Match(int Duration) //Function 3 
{
    Time=Duration; 
    cout<<"Another Match begins now"<<endl; 
}

Match(Match &M) //Function 4 
{
    Time=M.Duration; 
    cout<<"Like Previous Match "<<endl;
}

};

i) Which category of constructor - Function 4 belongs to and what is the purpose of using it?
ii) Write statements that would call the member Functions 1 and 3

Answer:

Copy constructor, it will help to copy the data from one object to another.
(½ Mark for mentioning copy constructor)
(½ Mark for explaining the purpose)

ii)

Answer:

Match M; //Function 1
Match N(10); //Function 3

(½ Mark for each statement)

(c) Define a class in C++ with following description:

Private Members
- A data member Flight number of type integer
- A data member Destination of type string
- A data member Distance of type float
- A data member Fuel of type float
• A member function CALFUEL() to calculate the value of Fuel as per the following criteria:
  Distance   Fuel
  <=1000     500
  more than 1000 and <=2000  1100
  more than 2000   2200

Public Members
• A function FEEDINFO() to allow user to enter values for Flight Number, Destination, Distance & call function CALFUEL() to calculate the quantity of Fuel
• A function SHOWINFO() to allow user to view the content of all the data members

Answer:
class FLIGHT
{
  int Fno;
  char Destination[20];
  float Distance, Fuel;
  void CALFUEL();
  public:
    void FEEDINFO();
    void SHOWINFO();
};
void FLIGHT::CALFUEL()
{
  if (Distance<=1000)
    Fuel=500;
  else
    if (Distance<=2000)
      Fuel=1100;
    else
      Fuel=2200;
}
void FLIGHT::FEEDINFO()
{
  cout<<"Flight No : ":cin>>Fno;
  cout<<"Destination : ":gets(Destination);
  cout<<"Distance : ":cin>>Distance;
  CALFUEL();
}
void FLIGHT::SHOWINFO()
{
  cout<<"Flight No : "<<Fno<<endl;
  cout<<"Destination : "<<Destination<<endl;
  cout<<"Distance : "<<Distance<<endl;
cout << "Fuel:" <<Fuel<<endl;
}
(½ Mark for correct syntax for class header)
(½ Mark for correct declarations of data members)
(1 Mark for appropriate definition of function CALFUEL())
(1 Mark for appropriate definition of FEEDINFO() with a call for function CALFUEL())
(1 Mark for appropriate definition of SHOWINFO())
(d) Answer the questions (i) to (iv) based on the following:

```
class CUSTOMER
{
    int Cust_no;
    char Cust_Name[20];
protected:
    void Register();
public:
    CUSTOMER();
    void Status();
};
class SALESMAN
{
    int Salesman_no;
    char Salesman_Name[20];
protected:
    float Salary;
public:
    SALESMAN();
    void Enter();
    void Show();
};
class SHOP : private CUSTOMER, public SALESMAN
{
    char Voucher_No[10];
    char Sales_Date[8];
public:
    SHOP();
    void Sales_Entry();
    void Sales_Detail();
};
```

(i) Write the names of data members which are accessible from objects belonging to class CUSTOMER.
Answer:
None of the data members are accessible from objects belonging to class CUSTOMER.

(1 Mark for correct answer)

(ii) Write the names of all the member functions which are accessible from objects belonging to class SALESMAN.

Answer:
Enter(), Show()

(1 Mark for correct answer)

Note:
No marks to be awarded for any other alternative answer

(iii) Write the names of all the members which are accessible from member functions of class SHOP.

Answer:
Data members: Voucher_No, Sales_Date, Salary
Member function: Sales_Entry(), Sales_Detail(), Enter(), Show(), Register(), Status()

(1 Mark for correct answer)

(iv) How many bytes will be required by an object belonging to class SHOP?

Answer:
66 bytes

(1 Mark for correct answer)

3. (a) Write a function in C++ to combine the contents of two equi-sized arrays A and B by adding their corresponding elements as the formula A[i]+B[i], where value i varies from 0 to N-1 and transfer the resultant content in the third same sized array C. 3

Answer:
void AddNSave(int A[], int B[], int C[], int N)
{
for (int i=0; i<N; i++)
C[i]=A[i]+B[i];
}
(1 Mark for correct Function Header with appropriate parameters)
(1 Mark for appropriate loop)
(1 Mark for correct expression for addition of corresponding elements)
(i) An array P[20][30] is stored in the memory along the column with each of the
element occupying 4 bytes, find out the Base Address of the array, if an element $P[2][20]$
is stored at the memory location 5000.

Answer:

<table>
<thead>
<tr>
<th>Given,</th>
</tr>
</thead>
<tbody>
<tr>
<td>$W=4$</td>
</tr>
<tr>
<td>$N=20$</td>
</tr>
<tr>
<td>$M=30$</td>
</tr>
<tr>
<td>Loc($P[2][20]$)=5000</td>
</tr>
<tr>
<td>Column Major Formula:</td>
</tr>
<tr>
<td>Loc($P[I][J]$) = Base($P$)+$W*(N*J+I)$</td>
</tr>
<tr>
<td>Loc($P[2][20]$) = Base($P$) + 4*(20*20+2)</td>
</tr>
<tr>
<td>Base($P$) = 5000 - 4*(400+2)</td>
</tr>
<tr>
<td>= 5000 - 1608</td>
</tr>
<tr>
<td>= 3392</td>
</tr>
</tbody>
</table>

(1 Mark for writing correct formula (for column major) OR substituting formula with
correct values)

(1 Mark for writing calculation step – at least one step)

(1 Mark for correct address)

(ii) Write a function in C++ to perform Push operation on a dynamically allocated stack
containing real numbers.

Answer:

```cpp
struct NODE
{
    float Data; NODE *Link;
};
class STACK
{
    NODE *Top;
    public:
    STACK();
    void Push();
    void Pop();
    void Display();
    ~STACK();
};
void STACK::Push()
{
NODE *Temp;
Temp = new NODE;
cin >> Temp->Data;
Temp->Link = Top;
Top = Temp;
}

(1 Mark for declaring Temp pointer)
(1 Mark for creating a new node and assigning/entering appropriate values in it)
(1 Mark for connecting link part of new node to top)
(1 Mark for assigning Top as the new node i.e. Temp)

(iii) Write a function in C++ to find sum of each row for a two dimensional integer array having 3 rows and 4 columns which is passed as parameter of the function. 2
Answer:
void MatAdd(int M[][4], int N, int M)
{
    for (int R = 0; R < N; R++)
    {
        int SumR = 0;
        for (int C = 0; C < M; C++)
            SumR += M[R][C];
        cout << SumR << endl;
    }
}

(½ Mark for correct function header)
(½ Mark for appropriate outer loop)
(½ Mark for appropriate inner loop)
(½ Mark for correctly initializing SumR and calculating the sum)

(iv) Evaluate the following postfix notation of expression showing the stack contents for each step of evaluation: 2
True, False, AND, True, True, NOT, OR, AND 
Answer:
Step 1: Push

True
Step 8: AND

<table>
<thead>
<tr>
<th>Pop</th>
<th>Op1=True</th>
<th>Push</th>
</tr>
</thead>
<tbody>
<tr>
<td>Op2=False</td>
<td>Op2=False</td>
<td>False</td>
</tr>
</tbody>
</table>

Step 9: Pop

| False | Result | False |

(½ Mark for correctly evaluating each operator)

4. (a) Observe the program segment given below carefully and answer the questions that follow: fill the blanks marked as Statement 1 and Statement 2 using seekg() and tellg() functions for performing the required task. 1

```cpp
#include <fstream.h>

class Employee
{
    int Eno; char Ename[20];

public:
    void Input() {cin >> Eno; cin.getline(Ename,20); }
    void Display() {cout << Eno << "#" << Ename << endl; }
};

int Countrec()
{
    ifstream File;
    Employee E;
    File.open("EMPDAT",ios::binary|ios::in);

    //Statement 1
    int Bytes = ____________________;

    //Statement 2
    int Count = Bytes / sizeof(Item);
    File.close();
    return Count;
}
```

(i) Write statement 1 to position the file pointer to the end of the file.
(ii) Write statement 2 to return the number of bytes from the beginning of the file to the current position of the file pointer.
(b) Write a function in C++ to count the number of alphabets present in a text file "NOTES.TXT".

Answer:

```cpp
void CountAlphabet()
{
    ifstream FIL("NOTES.TXT");
    int CALPHA=0;
    char CH=FIL.get();
    while (!FIL.eof())
    {
        if (isalpha(CH))
            CALPHA++;
        CH=FIL.get();
    }
    cout<<"No. of Alphabets:"<<CALPHA<<endl;
}
```

(½ Mark for opening NOTES.TXT correctly)
(½ Mark for initializing the counter and incrementing the counter)
(½ Mark for correctly reading a character from the file)
(½ Mark for checking for the alphabet)

(c) Write a function in C++ to add new objects at the bottom of a binary file "STUDENT.DAT", assuming the binary file is containing the objects of the following class.

```cpp
class STUD
{
    int Rno;
    char Name[20];
public:
    void Enter(){cin>>Rno;gets(Name);}
    void Display(){cout<<Rno<<Name<<endl;}
};
```
Answer:

```c++
void Addnew()
{
    fstream FILE;
    FILE.open("STUDENT.DAT", ios::binary | ios::app);
    STUD S;
    char CH;
    do
    {
        S.Enter();
        FILE.write((char*) &S, sizeof(S));
        cout << "More(Y/N)?"; cin >> CH;
    } while (CH == 'Y');
    FILE.close();
}
```

(½ Mark for opening STUDENT.DAT correctly)
(½ Mark for user input for the new object)
(1 Mark for appropriate loop)
(1 Mark for writing the record on to the binary file)

5. (a) What do you understand by the Union and Cartesian Product operations performed upon two relations?

Answer:

The relational operator Union (U) can be applied to two relations if their degree (attributes) is same. The resultant relation consists of the tuples of both the relations. However, the duplicate tuples are eliminated.

If two relations do not have common attribute names then the relations are called Product compatible. The resultant relation is in fact a concatenation of each tuple of A with each tuple of B.

(1 Mark each for the explanation of both the concepts)
Consider the following tables GAMES and PLAYER
and answer (b) and (c) parts of this question:

Table: GAMES

<table>
<thead>
<tr>
<th>GCode</th>
<th>GameName</th>
<th>Type</th>
<th>Number</th>
<th>PrizeMoney</th>
<th>ScheduleDate</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Carom Board</td>
<td>Indoor</td>
<td>2</td>
<td>5000</td>
<td>23-Jan-2004</td>
</tr>
<tr>
<td>102</td>
<td>Badminton</td>
<td>Outdoor</td>
<td>2</td>
<td>12000</td>
<td>12-Dec-2003</td>
</tr>
<tr>
<td>103</td>
<td>Table Tennis</td>
<td>Indoor</td>
<td>4</td>
<td>8000</td>
<td>14-Feb-2004</td>
</tr>
<tr>
<td>105</td>
<td>Chess</td>
<td>Indoor</td>
<td>2</td>
<td>9000</td>
<td>01-Jan-2004</td>
</tr>
<tr>
<td>108</td>
<td>Lawn Tennis</td>
<td>Outdoor</td>
<td>4</td>
<td>25000</td>
<td>19-Mar-2004</td>
</tr>
</tbody>
</table>

Table: PLAYER

<table>
<thead>
<tr>
<th>PCode</th>
<th>Name</th>
<th>Gcode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nabi Ahmad</td>
<td>101</td>
</tr>
<tr>
<td>2</td>
<td>Ravi Sahai</td>
<td>108</td>
</tr>
<tr>
<td>3</td>
<td>Jatin</td>
<td>101</td>
</tr>
<tr>
<td>4</td>
<td>Nazneen</td>
<td>103</td>
</tr>
</tbody>
</table>

(b) Write SQL commands for the following statements:

(i) To display the name of all GAMES with their GCodes

Answer:

SELECT GameName, Gcode FROM GAMES;

(1 Mark for correct query)

OR

(½ Mark for partially correct answer)

(ii) To display details of those GAMES which are having PrizeMoney more than 7000.

Answer:

SELECT * FROM Games WHERE Prizemoney > 7000;

(1 Mark for correct query)

OR

(½ Mark for partially correct answer)

(iii) To display the content of the GAMES table in ascending order of ScheduleDate.

Answer:

SELECT * FROM Games ORDER BY ScheduleDate;

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(1 Mark for correct query) OR

(½ Mark for partially correct answer)

(v) To display sum of PrizeMoney for each Type of GAMES

**Answer:**

```sql
SELECT SUM(Prizemoney).Type FROM Games GROUP BY Type;
```

(1 Mark for correct query)

OR

(½ Mark for partially correct answer)

(c) Give the output of the following SQL queries:

(i) SELECT COUNT(DISTINCT Number) FROM GAMES;

**Answer:**

(½ Mark for correct output)

(ii) SELECT MAX(ScheduleDate),MIN(ScheduleDate) FROM GAMES;

**Answer:**

<table>
<thead>
<tr>
<th>MAX(ScheduleDate)</th>
<th>MIN(ScheduleDate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-Mar-2004</td>
<td>12-Dec-2003</td>
</tr>
</tbody>
</table>

(½ Mark for correct output)

(iii) SELECT Name, GameName FROM GAMES G, PLAYER P WHERE G.Gcode=P.Gcode AND G.PrizeMoney>10000;

**Answer:**

| Ravi Sahai | Lawn Tennis |

(½ Mark for correct output)

(iv) SELECT DISTINCT Gcode FROM PLAYER;

**Answer:**

101
108
103

(½ Mark for correct output)
6. (a) State and algebraically verify Absorption Laws.  
   
   Answer:  
   For every \( X, Y \) * B  
   (i) \( X + X \cdot Y = X \)  
   (ii) \( X + X' \cdot Y = X + Y \)  
   
   Verification:  
   (i) \( X + X \cdot Y = X \)  
   L.H.S. = \( X + X \cdot Y \)  
   = \( X \cdot 1 + X \cdot Y \)  
   = \( X \cdot (1+Y) \)  
   = \( X \cdot 1 \)  
   = \( X \)  
   = R.H.S.  
   (ii) \( X + X' \cdot Y = X + Y \)  
   L.H.S. = \( X + X' \cdot Y \)  
   = \( (X + X') \cdot (X + Y) \)  
   = 1 \cdot (X + Y)  
   = \( X + Y \)  
   = R.H.S.  
   (1 Mark for stating the Absorption Laws)  
   (1 Mark for verifying the laws)  

   (b) Write the equivalent Boolean Expression for the following Logic Circuit  
   
   Answer:  
   \[ F(U,V) = (U \cdot V) + (U \cdot V') \]  
   (2 Marks for the final expression)  
   OR  
   (1 Mark for any one of the correct terms out of \( U \cdot V \) or \( U \cdot V' \))  
   (i) Write the SOP form of a Boolean function \( G \), which is represented in a truth table as follows:  

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Answer:
\[ F(P,Q,R) = P \cdot Q \cdot R' + P \cdot Q' \cdot R + P \cdot Q \cdot R' + P \cdot Q \cdot R \]
(1 Mark for the correct SOP expression)

(ii) Reduce the following Boolean Expression using K-Map:
\[ F(U,V,W,Z) = \pi(0,1,2,4,5,6,8,10) \]
Answer:

\[
\begin{array}{c|cccc}
  & UV & UV' & UV & UV' \\
\hline
WZ' & 0 & 4 & 12 & 8 \\
WZ & 1 & 5 & 13 & 9 \\
WZ & & 1 & 16 & 11 \\
WZ' & 2 & 6 & 14 & 10 \\
\end{array}
\]

\[ F(U,V,W,Z) = U \cdot V + W \cdot Z + U \cdot Z \]
(½ Mark for placing all 1s at correct positions in K-Map)
(½ Mark for each grouping)
(1 Mark for writing final expression in reduced/minimal form)
Note: Deduct ½ mark if wrong variable names are used

7. a) Define the term Bandwidth. Give any one unit of Bandwidth.
Answer:
Bandwidth is referred to the volume of information per unit of time that a transmission medium (like an Internet connection) can handle.

OR

The amount of data that can be transmitted in a fixed amount of time is known as bandwidth.
For digital devices, the bandwidth is usually expressed in bits per second (bps) or
bytes per second. For analog devices, the bandwidth is expressed in cycles per
second, or Hertz (Hz).

(1 Mark for correct definition)
(1 Mark for any one correct unit)

b) When do you prefer XML over HTML and why?  
   Answer:
   The first benefit of XML is that because you are writing your own markup lan-
   guage, you are not restricted to a limited set of tags defined by proprietary ven-
   dors. Rather than waiting for standards bodies to adopt tag set enhancements (a pro-
   cess which can take quite some time), or for browser companies to adopt each
   other's standards (yeah right!), with XML, you can create your own set of tags at
   your own pace.
   (1 Mark for appropriate explanation)

c) How firewall protects our Network?  
   Answer:
   A firewall is a part of a computer system or network that is designed to block
   unauthorized access while permitting authorized communications. It is a device or
   set of devices configured to permit, deny, encrypt, decrypt, or proxy all (in and out)
   computer traffic between different security domains based upon a set of rules and
   other criteria.
   (1 Mark for appropriate explanation)

d) What is the importance of URL in networking?  
   Answer:
   A Uniform Resource Locator (URL) is used to specify, where an identified re-
   source is available in the network and the mechanism for retrieving it. A URL is
   also referred to as a Web address.
   (1 Mark for appropriate explanation)

e) Ravya Industries has set up its new center at Kaka Nagar for its office and web
   based activities. The company compound has 4 buildings as shown in the diagram
   below:
Center to center distances between various buildings is as follows:

<table>
<thead>
<tr>
<th>Building Pair</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harsh Building to Raj Building</td>
<td>50 m</td>
</tr>
<tr>
<td>Raj Building to Fazz Building</td>
<td>60 m</td>
</tr>
<tr>
<td>Fazz Building to Jazz Building</td>
<td>25 m</td>
</tr>
<tr>
<td>Jazz Building to Harsh Building</td>
<td>170 m</td>
</tr>
<tr>
<td>Harsh Building to Fazz Building</td>
<td>125 m</td>
</tr>
<tr>
<td>Raj Building to Jazz Building</td>
<td>90 m</td>
</tr>
</tbody>
</table>

Number of Computers in each of the buildings is follows:

<table>
<thead>
<tr>
<th>Building</th>
<th>Computers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harsh</td>
<td>15</td>
</tr>
<tr>
<td>Raj</td>
<td>150</td>
</tr>
<tr>
<td>Fazz</td>
<td>15</td>
</tr>
<tr>
<td>Jazz</td>
<td>25</td>
</tr>
</tbody>
</table>

**e1) Suggest a cable layout of connections between the buildings.**

Answer: (Any of the following option)

Layout 1
(1 Mark for showing any of the above suitable cable layout)

**e2) Suggest the most suitable place (i.e. building) to house the server of this organisation with a suitable reason.**

*Answer:*

The most suitable place / block to house the server of this organisation would be Raj Building, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

(½ Mark for suggesting suitable place and ½ for appropriate reason)

**e3) Suggest the placement of the following devices with justification:**

(i) Internet Connecting Device/Modem  
(ii) Switch

*Answer:*

(i) Raj Building since it contains largest number of computers.  
(ii) In both the layouts, a hub/switch each would be needed in all the buildings, to interconnect the group of cables from the different computers in each block

(½ Mark each for suggesting suitable place for connecting the two devices)

**e4) The organisation is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer.**

*Answer:*

The type of network that shall be formed to link the sale counters situated in various parts of the same city would be a MAN, because MAN (Metropolitan Area Networks) are the networks that link computer facilities within a city.

(1 Mark for appropriate answer)
f) **Compare freeware and Shareware. 1**

**Answer:**
Freeware, the name is derived from words “free” and “software”. It is computer software that is available for use at no cost or for an optional fee. Freeware is generally proprietary software available at zero price, and is not free software. The author usually restricts one or more rights to copy, distribute, and make derivative works of the software.

Shareware is usually offered as a trial version with certain features only available after the license is purchased, or as a full version, but for a trial period. Once the trial period has passed the program may stop running until a license is purchased. Shareware is often offered without support, updates, or help menus, which only become available with the purchase of a license. The words “free trial” or “trial version” are indicative of shareware.

*(1 Mark for any one appropriate difference)*

---

**g) How Trojan Horses are different from Worms? Mention any one difference. 1**

**Answer:**
A Trojan horse is a term used to describe malware that appears to the user, to perform a desirable function but, in fact, facilitates unauthorized access to the user’s computer system. A computer worm is a self-replicating computer program. It uses a network to send copies of itself to other nodes (computers on the network) and it may do so without any user intervention.

*(1 Mark for any one appropriate difference)*