Computer Science (Code 083)
Sample Paper with Solution Set –II

Max. Marks: 70 **Duration: 3 Hours**

1.

(a) What is the difference between Object Oriented Programming and Procedural Programming? 2

Object Oriented Programming	Procedural Programming
• Emphasis on Data • Follows Bottom-Up approach in program design • Data hiding feature prevents accidental change in data • Features like data encapsulation, polymorphism, inheritance are present	• Emphasis on doing things (functions) • Follows Top-down approach in program design • Presence of Global variables increase chances of accidental change in data • Such features are not available

(b) Write the names of the header files to which the following belong: 1
(i) frexp() (ii) isalnum()

(i) math.h	(ii) ctype.h

(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;
   Color.Point1+=2;
   ShowPoint(Point2);
}
```

```
#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);
}
```

(d) Find the output of the following program: **3**

```
#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]<<'#';
    cout<<endl;
    for (L=0;L<4;L++) cout<<B[L] <<'#';
    cout<<endl;
    for (L=0;L<2;L++) cout<<C[L] <<'#';
}
```

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

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

```
#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.Magic[0]='A';N.Magic[3]='J';
    N.Score-=120;
    cout<<N.Magic<<N.Score<<endl;
}
```

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(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**

```
#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

2.

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

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 example of polymorphism, where more than one function carrying same name behave differently with different set of parameters passed to them.

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

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

```
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
   {
      Time=M.Duration;
      cout<<"Like Previous Match "<<end1;
   }

};
```

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

Answer:

Copy Constructor, it is invoked when an object is created and initialised with values of an already existing object.

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

Answer:

```
Match M1;          //for Function 1
Match M2(90);      //for Function 3
```

(b) Define a class in C++ with following description: 4

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**

```
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;;
}
```

(c) Answer the questions (i) to (iv) based on the following: 4

```
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?

(i) None of data members are accessible from objects belonging to class CUSTOMER.
(ii) Enter(), Show()
(iii) Data members: Voucher_No, Sales_Date, Salary
Member function: Sales_Entry(), Sales_Details(), Enter(), Show(), Register(), Status()
(iv) 66

3.

(a) Write a function in C++ to combine the contents of two equi-sized arrays A and B by computing their corresponding elements with the formula 2*A[i]+3*B[i]; where value i varies from 0 to N-1 and transfer the resultant content in the third same sized array. 4

```
void AddNSave(int A[],int B[],int C[],int N)
{
    for (int i=0;i<N;i++)
        C[i]=2*A[i]+3*B[i];
}
```

(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 memory location for the element P[5][15], if an element P[2][20] is stored at the memory location 5000. 4

Given,
W=4
N=20
M=30
Loc(P[2][20])=5000
Column Major Formula:

Loc(P[I][J])	=Base(P)+W*(N*J+I)
Loc(P[2][20])	=Base(P)+4*(20*20+2)
5000	=Base(P)+4*(400+2)
Base(P)	=5000- 804
Base(P)	=4196
Loc(P[5][15])	=4196+4*(20*15+5)
	=4196+4*(300+5)
	=4196+1220
	=5416

(c) Write a function in C++ to perform Push operation on a dynamically allocated Stack containing real numbers. 4

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

(d) Write a function in C++ to find sum of rows from a two dimensional array. 2

```
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[C][R];
      cout<<SumR<<endl;
   }
}
```

(e) Evaluate the following postfix notation of expression: 2
True, False, AND, True, True, NOT, OR, AND

Step 1: Push

True

Step 2: Push

False
True

Step 3: AND

	Pop		Pop	Push
	Op2=True		Op1=False	
			Op2=True	
True				False

Step 4: Push

True
False

Step 5: Push

True
True
False

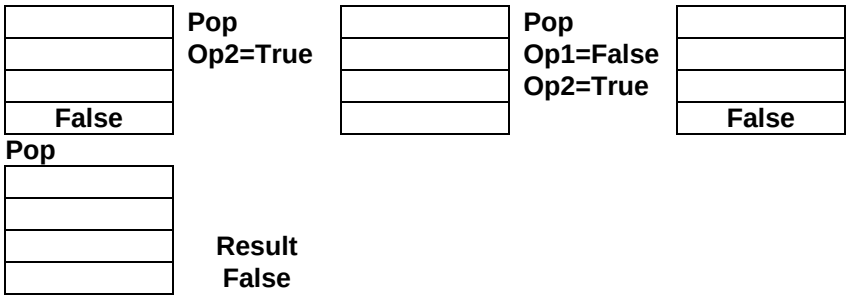
Step 6: NOT

	Pop	Push
	Op2=True	False
True		True
False		False

Step 7: OR

	Pop		Pop	Push
	Op2=False		Op1=True	
True			Op2=False	True
False		False		False

Step 8: AND **Push**



4.

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

```
#include <fstream.h>
class Employee
{
   int Eno;char Ename[20];
public:
   //Function to count the total number of records
   int Countrec();
};
int Item::Countrec()
{
   fstream File;
   File.open("EMP.DAT",ios::binary|ios::in);
   _____                                    //Statement 1

   int Bytes =    _____                     //Statement 2

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

Answer:

```
File.seekg(0,ios::end); //Statement 1
File.tellg();           //Statement 2
```

(b) Write a function in C++ to count the number of alphabets present in a text file "NOTES.TXT". 2

```
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;
}
```

(b) 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. 3

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

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

5.

(a) What do you understand by Primary Key & Candidate Keys? 2

An attribute or set attributes which are used to identify a tuple uniquely is known as Primary Key. If a table has more than one such attributes which identify a tuple uniquely than all such attributes are known as Candidate Keys.

(b) Consider the following tables GAMES and PLAYER. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii) 6

Table: GAMES

GCode	GameName	Number	PrizeMoney	ScheduleDate
101	Carom Board	2	5000	23-Jan-2004
102	Badminton	2	12000	12-Dec-2003
103	Table Tennis	4	8000	14-Feb-2004
105	Chess	2	9000	01-Jan-2004
108	Lawn Tennis	4	25000	19-Mar-2004

Table: PLAYER

PCode	Name	Gcode
1	Nabi Ahmad	101
2	Ravi Sahai	108
3	Jatin	101
4	Nazneen	103

(i) To display the name of all Games with their Gcodes

SELECT GameName,Gcode FROM GAMES;

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

SELECT * FROM GAMES WHERE PrizeMoney>7000

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

SELECT * FROM GAMES ORDER BY ScheduleDate;

(iv) To display sum of PrizeMoney for each of the Number of participation groupings (as shown in column Number 2 or 4)

SELECT SUM(PrizeMoney),Number FROM GAMES GROUP BY Number;

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

2

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

19-Mar-2004 12-Dec-2003

(vii)SELECT SUM(PrizeMoney) FROM GAMES;

59000

(viii) SELECT DISTINCT Gcode FROM PLAYER;

101
108
103

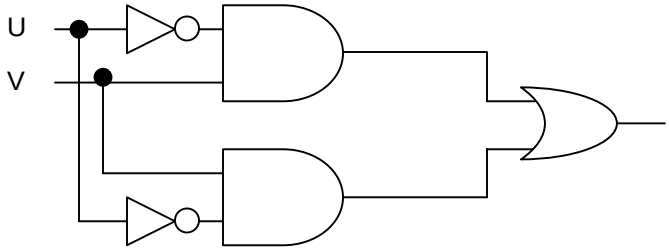
6.

(a) State and algebraically verify Absorbtion Laws. 2

X+X.Y = X
L.H.S = X+X.Y
= X.1+X.Y
= X.(1+Y)
= X.1
= X
= R.H.S

X+X'.Y = X+Y
L.H.S. = X+X'.Y
= (X+X').(X+Y)
= 1.(X+Y)
= X+Y
= R.H.S

(b) Write the equivalent Boolean Expression for the following Logic Circuit **2**



F(U,V)=U'.V+U.V'

(c) Write the SOP form of a Boolean function G, which is represented in a truth table as follows: **1**

P	Q	R	G
0	0	0	0
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

G(P,Q,R) = P'.Q.R'+P.Q'.R'+P.Q.R'+P.Q.R

(d) Reduce the following Boolean Expression using K-Map: **3**
F(U,V,W,Z)=Π(0,1,2,4,5,6,8,10)

	U'V'	U'V	UV	UV'
W'Z'	0	4	1 (12)	(8)
W'Z	1	5	1 (13)	1 (9)
WZ	1 (3)	1 (7)	1 (15)	1 (11)
WZ'	2	6	1 (14)	10

F(U,V,W,Z)=UV+WZ+UZ

7.

a) Define the term Bandwidth. Give unit of Bandwidth. **1**

Answer:

Bandwidth is the capability of a medium to transmit an amount of information over a distance. Bandwidth of a medium is generally measured in Bytes per second (bps) or more commonly in kilobytes per second (kbps)

b) Expand the following terminologies: **1**

(i) HTML (ii) XML

Answer:

(i) Hypertext Markup Language

(ii) Extended Markup Language

c) Define the term firewall. **1**

Answer:

Firewall is a feature used for Network Security. In a Network there is always danger of information leaking out or leaking in. Firewall is a feature which forces all information entering or leaving the network to pass through a check to make sure that there is no unauthorized usage of the network.

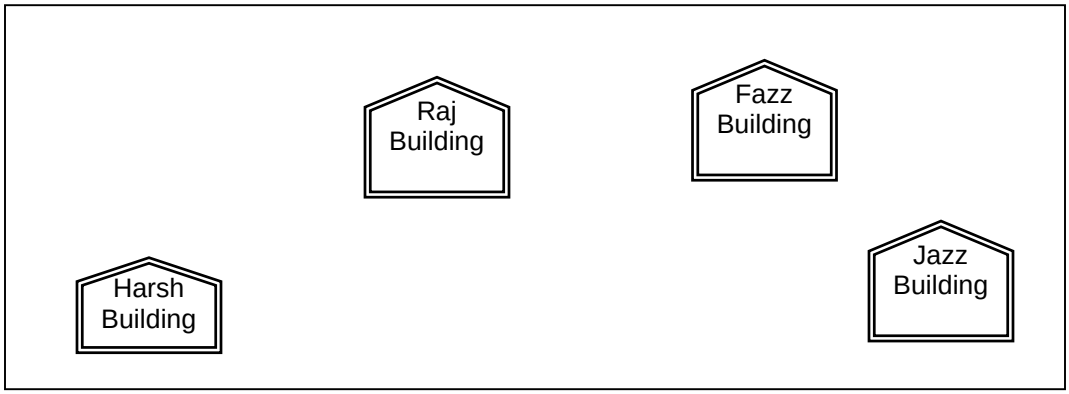
d) What is the importance of URL in networking? **1**

Answer:

URL stands for Uniform Resource Locator. Each page that is created for Web browsing is assigned a URL that effectively serves as the page's worldwide name or address. URL's have three parts: the protocol , the DNS name of the machine on which the page is located and a local name uniquely indicating the specific page(generally the filename).

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:

Harsh Building to Raj Building	50 m
Raz Building to Fazz Building	60 m
Fazz Building to Jazz Building	25 m
Jazz Building to Harsh Building	170 m
Harsh Building to Fazz Building	125 m
Raj Building to Jazz Building	90 m

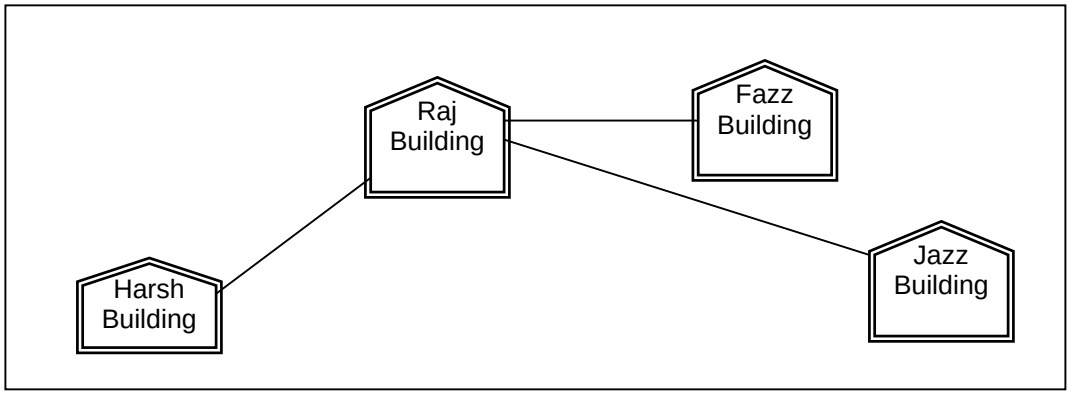
Number of Computers in each of the buildings is follows:

Harsh Building	15
Raj Building	150
Fazz Building	15
Jazz Bulding	25

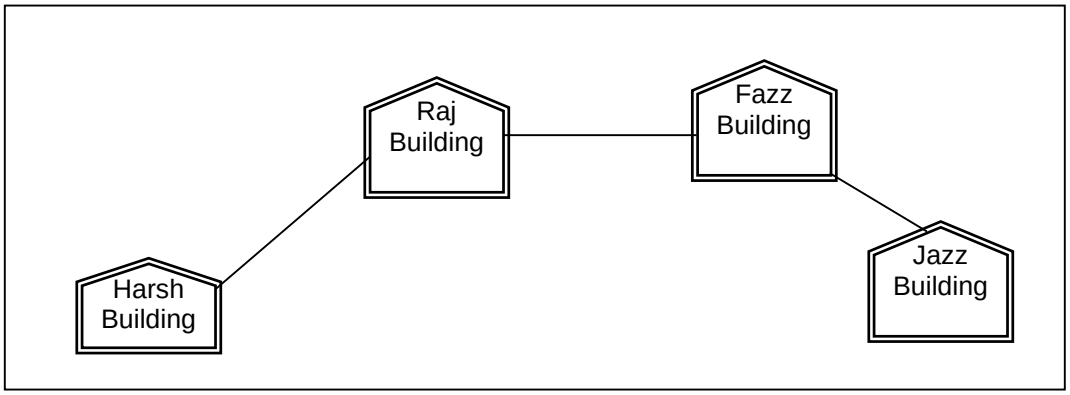
e1) Suggest a cable layout of connections between the buildings. **1**

Answer:

Layout 1:



Layout 2: Since the distance between Fazz Building and Jazz Building is quite short



e2) Suggest the most suitable place (i.e. building) to house the server of this organisation with a suitable reason. 1

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.

e3) Suggest the placement of the following devices with justification: 1

(i) Internet Connecting Device/Modem

(ii) Switch

(i) Raj Building

(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

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. 1

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.