Central Board of Secondary Education
Computer Science (Theory) - Class XII
Subject Code: 083

Blue Print Of Question Paper for 2012 Examinations

S.No.	UNIT	VSA (1 Mark)	SA I (2 Marks)	SA II (3 Marks)	LA (4 Marks)	TOTAL
1	**Review of C++ covered in Class XI**	1 (1)	8 (4)	3 (1)		12 (6)
2	**Object Oriented Programming in C++**					
	a) Introduction to OOP using C++		2 (1)		4 (1)	6 (2)
	b) Constructor & Destructor		2 (1)			2 (1)
	c) Inheritance				4 (1)	4 (1)
3	**Data Structure & Pointers**					
	a) Address Calculation			3 (1)		3 (1)
	b) Static Allocation of Objects		2 (1)	3 (1)		5 (2)
	c) Dynamic Allocation of Objects				4 (1)	4 (1)
	d) Infix & Postfix Expressions		2 (1)			2 (1)
4	**Data File Handling in C++**					
	a) Fundamentals of File Handling	1 (1)				1 (1)
	b) Text File	2 (1)				2 (1)
	c) Binary Files			3 (1)		3 (1)
5	**Databases and SQL**					
	a) Database Concepts		2 (1)			2 (1)
	b) Structured Query Language		2 (1)		4 (1)	6 (2)
6	**Boolean Algebra**					
	a) Introduction to Boolean Algebra & Laws		2 (1)			2 (1)
	b) SOP & POS	1 (1)				1 (1)
	c) Karnaugh Map			3 (1)		3 (1)
	d) Basic Logic Gates		2 (1)			2 (1)

7	Communication & Open Source Concepts					
	a) Introduction to Networking	2 (2)				2 (2)
	b) Media, Dvices, Topologies & Protocols				4 (1)	4 (1)
	c) Security	2 (2)				2 (2)
	d) Webservers	1 (1)				1 (1)
	e) Open Source Terminologies	1 (1)				1 (1)
	TOTAL	**9 (9)**	**26 (13)**	**15 (5)**	**20 (5)**	**70 (32)**

Central Board of Secondary Education
Computer Science (Theory) - Class XII
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Design of Question Paper 2012 Examinations

Time : 3 hours   **Max. Marks: 70**

Weightage of marks over different dimensions of the question paper shall be as follows:

A. Weightage to different topics/content units

S.No	Topics	Marks
1	Review of C++ covered in Class XI	12
2	Object Oriented Programming in C++	12
3	Data Structure & Pointers	14
4	Data File Handling in C++	06
5	Databases and SQL	08
6	Boolean Algebra	08
7	Communication and Open Source Concepts	10
	Total	70

B. Weightage to different forms of questions

S.No	Forms of Questions	Marks for each question	No. of Questions	Total Marks
1	Very Short Answer questions (VSA)	01	09	09
2	Short answer questions - Type I (SA I)	02	13	26
3	Short answer questions - Type II (SA II)	03	05	15
4	Long answer questions (LA)	04	05	20
		Total	32	70

C. Scheme of Options

There will be no overall choice. All questions are compulsory.

D. Difficulty level of questions

- Based on the above design, two sets of sample papers along with their blue prints and Marking schemes have been included in this document.
- About 20% weightage has been assigned to questions testing higher order thinking (HOT) skills of learners.

SAMPLE PAPER - SET I
COMPUTER SCIENCE [CODE-083]
CLASS - XII

Max Time : 3 hours   **Max Marks : 70**

1.   (a)   Differentiate between the post-increment and pre-increment operators. Also, give a suitable C++ code to illustrate both.   **2**

    (b)   Which C++ header file(s) are essentially required to be included to run/execute the following C++ code: **1**

```
void main()
{
        int Last=25;
        for (int C=9;C<=Last;C++)
        cout<<C<<":"<<sqrt(C)<<endl;
}
```

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

```
#include {iostream.h}
CLASS User
{
long Userid;char Gender;
public:
void Authorize{cin>>Userid>>Gender;}
void Show(){cout<<Userid<<":"<<Gender<<endl;}
};
void main()
{
User U;
U.Authorize();
Show();
}
```

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

```
#include <iostream.h>
struct STOCK
```

```
{ int Ino, Qty;};
void Buy(STOCK &I, int TQ=2)
{
I.Qty+=TQ;
}
void main()
{
STOCK I[2]={{101,50},{103,20}};
Buy(I[1],5);
cout<<I[1].Ino<<":"<<I[1].Qty<<endl;
Buy(I[0],10);
cout<<I[0].Ino<<":"<<I[0].Qty<<endl;
Buy(I[1]);
cout<<I[1].Ino<<":"<<I[1].Qty<<endl;
}
```

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

```
#include <iostream.h>
#include <ctype.h>
void Decode(char Text[])
{
for (int C=0;Text[C];C++)
{
char CH=(Text[C]>='a' && Text[C]<='z')?Text[C]-32:Text[C];
if (CH<='M' && CH>='H')
Text[C]='#';
else if (CH=='A' || CH=='E' || CH=='U')
Text[C]=tolower(CH);
else if (CH>='0' && CH<='9')
Text[C]='$';
else
Text[C]=toupper(CH);
}
}
void main()
{
char SMS[]="US2InDIA";
```

```
Decode(SMS);
cout<<SMS<<endl;
}
```

(f) Observe the following program and find out, which option or options out of (i) to (iv) will not be expected output(s) from the program? What will be the minimum and the maximum value assigned to the variable Sequence, when the value of C is 2? 2

```
#include <iostream.h>
#include <stdlib.h>
void main()
{
int Sequence,Select[4]={25,90,30,45};
randomize();
for (int C=0;C<4;C++)
{
Sequence=random(4-C);
cout<<Select[Sequence]<<"@";
}
}
```

(i) 45@90@30@25@

(ii) 90@25@90@25@

(iii) 30@30@25@25@

(iv) 30@30@90@25@

2. (a) **What do you understand by Data Encapsulation and Data Hiding? Also, give a suitable C++ code to illustrate both** 2

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

class Conference
```
{
int Duration;//In Hours
public:
Conference()                          //Function 1
{
```

Duration=8;cout<<"Inauguration"<<end1;

}

~Conference()   //Function 2

{

cout<<"Concluding Ceremony"<<end1;

}

void Session(int S=1)   //Function 3

{

cout<<"Session "<<S<<" is on"<<end1;

}

Conference(int Duration)   //Function 4

{

Time=Duration;cout<<"Inauguration"<<end1;

}

};

i)   In Object Oriented Programming, what is Function 2 referred as and when does it get invoked/called?

ii)   In Object Oriented Programming, which concept is illustrated by Function 1 and Function 4 together? Write an example illustrating the calls for these two functions.

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

Private Members

- CarID of type long int
- AboutCar of type string
- Cartype of type string
- Rent of type float
- A member function AssignRent() to assign the following values for Rent as per the given Cartype:

Cartype	Rent
Small	1000
Van	800
SUV	2500

Public Members

- A function GetCar() to allow user to enter values for CarID, AboutCar, Cartype and call function AssignRent() to assign Rent

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- A function ShowCar() to allow user to view the content of all the data members

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

```
class PUBLISHER
{
        char Pub[12];
        double Turnover;
protected:
        void Register();
public:
        PUBLISHER();
        void Enter();
        void Display();
};
class BRANCH
{
        char CITY[20];
protected:
        float Employees;
public:
        BRANCH();
        void Haveit();
        void Giveit();
};
class AUTHOR : private BRANCH , public PUBLISHER
{
        int Acode;
        char Aname[20];
        float Amount;
public:
        AUTHOR();
        void Start();
        void Show();
};
```

(i)   Write the names of data members, which are accessible from objects belonging to class AUTHOR.

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

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

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

3. (a)   Write a function TRANSFER(int A[ ], int B[ ], int Size) in C++ to create the elements of array B[ ] with the help of corresponding elements of array A[ ] i.e. If A[N] is positive number, B[N] should be 1, if A[N] is negative number B[N] should be -1, and if A[N] is zero B[N] should also be 0.   3

For example:

If the content of array A is

-98,56, 0,-23,-34,54

The content of array B should become

-1 , 1, 0, -1, -1, 1

(b)   An array P[40][30] is stored in the memory along the row with each of the element occupying 4 bytes and the very first element has the memory location as 4500, find out the following:

(i)   Memory location for the element P[10][20],

(ii)   Total no. of bytes required by the array P in the memory.   3

(c)   Write a function in C++ to perform Insert operation in a static circular Queue containing Players information (represented with the help of an array of structure PLAYER).   4

```
struct PLAYER
{
        long PID;                    //Player ID
        char Pname[20];     //Player Name
};
```

(d)   Write a function TRANSFORM(int A[][3], int N, int M) in C++ to swap the elements of first and the last row.   2

(e)   Evaluate the following POSTFIX notation. Show status of Stack after every step of evaluation (i.e. after each operator).   2

32, 4, /, 2, *, 12, 3, -, +

4. (a) Observe the program segment given below carefully and answer the questions that follow: 1

```
#include <fstream.h>
class Book
{
int Bno;char Title[20];
public:
void EnterVal() {cin>>Bno; cin.getline(Title,20);}
void ShowVal() {cout<<Bno<<"#"<<Title<<endl;}
};
void Search(int RecNo)
{
fstream File; Book B;
File.open("BOOK.DAT",ios::binary|ios::in);
_____                  //Statement 1
File.read((char*)&B,sizeof(B));
B.ShowVal();
File.close();
}
void Modify(int RecNo)
{
fstream File; Book B;
File.open("BOOK.DAT",ios::binary|ios::in|ios::out);
B.EnterVal();
_____                  //Statement 2
File.write((char*)&B,sizeof(B));
File.close();
}
```

(i) Write statement 1 to position the file pointer to the beginning of the desired record to be read, which is sent as parameter of the function (assuming RecNo 1 stands for the first record)

(ii) Write statement 2 to position the file pointer to the beginning of the desired record to be modified, which is sent as parameter of the function (assuming RecNo 1 stands for the first record)

(b) Write a function in C++ to count the word "this"(including "This"/"THIS" too) present in a text file "DIARY.TXT".   2

(c) Write a function in C++ to search for a Toy having a particular ToyCode from a binary file "TOY.DAT" and display its details (Tdetails), assuming the binary file is containing the objects of the following class.   3

```
class TOYSHOP
{
        int Tcode;                              //Toy Code
        char Tdetails[20];
public:
        int RTcode(){return Tcode;}
        void AddToy(){cin>>Tcode;gets(Tdetails);}
        void DisToy(){cout<<Tcode<<Tdetails<<endl;}
};
```

5. (a) What do you understand by Degree and Cardinality of a table?   2

Consider the following tables ACTIVITY and COACH
and answer (b) and (c) parts of this question:

Table: ACTIVITY

ACode	ActivityName	Stadium	ParticipantsNum	PrizeMoney	ScheduleDate
1001	Relay 100x4	Star Annex	16	10000	23-Jan-04
1002	High jump	Star Annex	10	12000	12-Dec-03
1003	Shot Put	Super Power	12	8000	14-Feb-04
1005	Long Jump	Star Annex	12	9000	01-Jan-04
1008	Discuss Throw	Super Power	10	15000	19-Mar-04

Table: COACH

PCode	Name	Acode
1	Ahmad Hussain	1001
2	Ravinder	1008
3	Janila	1001
4	Naaz	1003

(b) **Write SQL commands for the flowing statements:** 4

(i) To display the names of all activities with their Acodes in descending order.

(ii) To display sum of PrizeMoney for the Activities played in each of the Stadium separately.

(iii) To display the coach's name and ACodes in ascending order of ACode from the table COACH

(iv) To display the content of all activities for which ScheduleDate is earlier than 01-01-2004 in ascending order of ParticipantsNum.

(c) **Give the output of the following SQL queries:** 2

(i) SELECT COUNT(DISTINCT ParticipantsNum) FROM ACTIVITY;

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

(iii) SELECT Name,ActivityName FROM ACTIVITY A,COACH C

WHERE A.Acode=C.Acode AND A.ParticipantsNum=10;

(iv) SELECT DISTINCT ParticipantsNum FROM ACTIVITY;

6. (a) **State and verify De Morgan's Laws using truth table.** 2

(b) **Write the equivalent Boolean Expression for the following Logic Circuit** 2
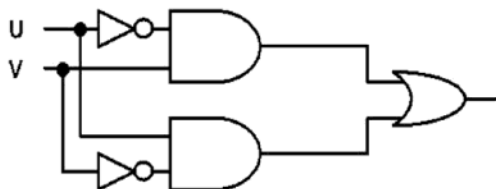
(c) **Write the POS form of a Boolean function F, which is represented in a truth table as follows:** 1

U	V	W	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(A,B,C,D) = ∑ (0,1,2,4,5,6,8,10)

7. a) What is VoIP? 1

b) Anuradha is a web developer. She has designed a login form to input the login id and password of the user. She has to write a script to check whether the login id and the corresponding password as entered by the user are correct or not. What kind of script from the following will be most suitable for doing the same?

(i) JSP

(ii) Client Side Script

(iii) VB Script 1

c) Ramanathan's friend Suryansh visited his office for giving an invitation for his wedding. During the visit, he requested Ramanathan to work on his office computer to send an urgent mail. While working on the computer, Suryansh was tempted by seeing some important documents on his desktop and cleverly uploaded them to his Online Folder without taking his consent (Suryansh did not even inform Ramanathan about this). What name from the following would you give to the above act committed by Suryansh?

(i) Trojan

(ii) Cyber Crime

(iii) Virus 1

d) What do you mean by IP Address? How is it useful in Computer Security? 1
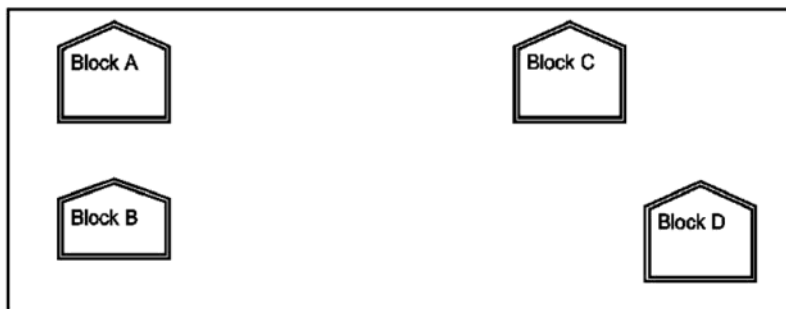
e) Knowledge Supplement Organisation has set up its new center at Mangalore for its office and web based activities. It has 4 blocks of buildings as shown in the diagram above: 4

Center to center distances between various blocks

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

Number of Computers

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

e1) Suggest a cable layout of connections between the blocks.

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

e3) Suggest the placement of the following devices with justification

(i) Repeater

(ii) Hub/Switch

e4) 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?

f) What do you mean by Spam Mails? How can you protect your mailbox from Spams? 1

g) Mention any two advantages of Open Source Software over Proprietary Software. 1

Max Time : 3 hours   **Max Marks : 70**

1.   (a)   **Differentiate between the post-increment and pre-increment operators.**
           Also, give a suitable C++ code to illustrate both.   **2**
           Answer:

Post-increment	Pre-increment
++ is an increment operator to increment the value of a variable by one, when used after the operand it is known as postincrement operator.	When ++ is used before an operand to increment its value by one, it is called a pre-increment operator.
```#include <iostream.h>``` ``` void main()``` ``` {``` ``` int NUM=9;``` ``` cout<<++NUM; //10 will be displayed``` ``` cout<<NUM++; //10 will be displayed``` ``` cout<<NUM; //11 will be displayed``` ``` }```	

           (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)   Which C++ header file(s) will be essentially required to be included to run/ex-
           ecute the following C++code: 1
           void main()
           {
            int Last=25;

```
for (int C=9;C<=Last;C++)
    cout<<C<<":"<<sqrt(C)<<endl;
}
```

Answer:

(i) iostream.h (for cout)	(ii) math.h (for sqrt())

(½ 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}
CLASS User
{
long Userid;char Gender;
public:
        void Authorize{cin>>Userid>>Gender;}
        void Show(){cout<<Userid<<":"<<Gender<<endl;}
};
void main()
{
User U;
U.Authorize();
Show();
}
```

Answer:

```
#include <iostream.h>
class User
{
long Userid;char Gender;
public:
        void Authorize(){cin>>Userid>>Gender;}
        void Show(){cout<<Userid<<":"<<Gender<<endl;}
};
void main()
{
User U;
U.Authorize();
U.Show();
}
```

(½ Mark for each correction)

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

```
#include <iostream.h>
struct STOCK
{ int Ino, Qty;};
void Buy(STOCK &I, int TQ=2)
{
I.Qty+=TQ;
}
void main()
{
STOCK I[2]={{101,50},{103,20}};
Buy(I[1],5);
cout<<I[1].Ino<<":"<<I[1].Qty<<endl;
Buy(I[0],10);
cout<<I[0].Ino<<":"<<I[0].Qty<<endl;
Buy(I[1]);
cout<<I[1].Ino<<":"<<I[1].Qty<<endl;
}
```

Answer:

```
103:25
101:60
103:27
```

(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:**   2

```
#include <iostream.h>
#include <ctype.h>
void Decode(char Text[])
{
        for (int C=0;Text[C];C++)
{
char CH=(Text[C]>='a' && Text[C]<='z')?Text[C]-32:Text[C];
        if (CH<='M' && CH>='H')
        Text[C]='#';
```

```
else if (CH=='A' || CH=='E' || CH=='U')
Text[C]=tolower(CH);
else if (CH>='0' && CH<='9')
Text[C]='$';
else
Text[C]=toupper(CH);
}
};
void main()
{
char SMS[]="US2InDIA";
Decode(SMS);
cout<<SMS<<endl;
}
```

Answer:

uS$#ND#a

(½ Mark for # as 4th and 7th characters)

(½ Mark for $ as 3rd character)

(½ Mark for u as 1st and a as 8th characters)

(½ Mark for S as 2nd, N as 5th and D as 6th characters)

(f)   Observe the following program and find out, which option or options out of (i) to (iv) will not be expected output(s) from the program? What will be the minimum and the maximum value assigned to the variable Sequence, when the value of C is 2?   2

```
#include <iostream.h>
#include <stdlib.h>
void main()
{
        int Sequence,Select[4]={25,90,30,45};
        randomize();
        for (int C=0;C<4;C++)
{
        Sequence=random(4-C);
        cout<<Select[Sequence]<<"@";
  }
}
```

(i) 45@90@30@25@

(ii) 90@25@90@25@

(iii) 30@30@25@25@

(iv) 30@30@90@25@

Answer:

Option (i) will not be the expected output (since when C = 2, Sequence will accept a value as random(2), i.e., either 0 or 1, so the 3rd value can either be 25 or 90, whereas for option (i) the 3rd value given is 30).

When C = 2, Minimum value for Sequence = 0, Maximum value for Sequence =1

(1 Mark for writing the correct unexpected output)

(½ Mark each for correct minimum and maximum values of Sequence)

2.(a) What do you understand by Data Encapsulation and Data Hiding? Also, give a suitable C++ code to illustrate both   2

Answer:

Data Encapsulation: Wrapping up of data and functions together in a single unit is known as Data Encapsulation. In a class, we wrap up the data and functions together in a single unit.

Data Hiding: Keeping the data in private visibility mode of the class to prevent it from accidental change is known as Data Hiding.

```
class Computer
{
    char CPU[10];int RAM;
public:
        void STOCK();
        void SHOW();
};
```

Private data members:Data HIdIng

Data members and member functions in one unit : Data Encapsulation

(½ Mark each for appropriate definitions)

(1 Mark for appropriate example illustrating both concepts)

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

```
class Conference
{
        int Duration;//In Hours
public:
```

```
Conference()              //Function 1
{
  Duration=8;cout<<"Inauguration"<<end1;
}
~Conference()             //Function 2
{
  cout<<"Concluding Ceremony"<<end1;
}
void Session(int S=1)     //Function 3
{
  cout<<"Session "<<S<<" is on"<<end1;
}
Conference(int Duration)  //Function 4
{
  Time=Duration;cout<<"Inauguration"<<end1;
}
};
```

i)   In Object Oriented Programming, what is Function 2 referred as and when does it get invoked/called?

ii)   In Object Oriented Programming, which concept is illustrated by Function 1 and Function 4 together? Write an example illustrating the calls for these functions.

i)
Answer:

Destructor, it is invoked itself as soon as the scope of the object gets over.

(½ Mark for mentioning destructor)
(½ Mark for explaining when it is invoked)

ii)
Answer:

Constructor Overloading (or Function Overloading or Polymorphism)
Conference C1;   //Function 1 gets called
Conference C2(90);   //Function 4 gets called

(½ Mark for mentioning the correct concept)
(½ Mark for the example)

(c)   Define a class CARRENTAL in C++ with following description: 4
        Private Members
        • CarID of type long int
        • AboutCar of type string
        • Cartype of type string
        • Rent of type float
        • A member function AssignRent() to assign the following values for Rent as per
          the given Cartype:

Cartype	Rent
Small	1000
Van	800
SUV	2500

Public Members
• A function GetCar() to allow user to enter values for CarID, AboutCar, Cartype and
  call function AssignRent() to assign Rent
• A function ShowCar() to allow user to view the content of all the data members

Answer:

```
class CARRENTAL
{
      long int CarID;
      char AboutCar[20];
      char Cartype[6];
      float Rent;
      void AssignRent();
public:
      void GetCar();
      void ShowCar();
};
void CARRENTAL::AssignRent()
{
      if(strcmp(Cartype,"Small")==0)
            Rent=1000;
      else if(strcmp(Cartype,"Van")==0)
            Rent=800;
      else if(strcmp(Cartype,"SUV")==0)
            Rent=2500;
}
void CARRENTAL::GetCar()
```

```
{
        cout<<"Car ID : ";cin>>CarID;
        cout<<"Description        : ";gets(AboutCar);
        cout<<"Car Type           : ";gets(Cartype);
AssignRent();
}
void CARRENTAL::ShowCar()
{
        cout<<"Car ID : "<<CarID<<endl;
        cout<<"Description : "<<AboutCar<<endl;
        cout<<"Car Type : "<<Cartype<<endl;;
        cout<<"Rent : "<<Rent<<endl;;
}
```

(½ Mark for correct syntax for class header)

(½ Mark for correct declarations of data members)

(1 Mark for appropriate definition of function AssignRent())

(1 Mark for appropriate definition of GetCar() with a call for function AssignRent())

(1 Mark for appropriate definition of ShowCar())

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

```
class PUBLISHER
{
        char Pub[12];
        double Turnover;
protected:
        void Register();
public:
        PUBLISHER();
        void Enter();
        void Display();
};
class BRANCH
{
        char CITY[20];
protected:
        float Employees;
public:
        BRANCH();
        void Haveit();
        void Giveit();
```

```
};
class AUTHOR : private BRANCH , public PUBLISHER
{
        int Acode;
        char Aname[20];
        float Amount;
public:
        AUTHOR();
        void Start();
        void Show();
};
```

(i)   Write the names of data members, which are accessible from objects belonging to class AUTHOR.

Answer:

None of the data members are accessible from objects belonging to class AUTHOR.

(1 Mark for correct answer)

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

Answer:

Haveit(), Giveit()

(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 AUTHOR.

Answer:

Data members: Employees, Acode, Aname, Amount
Member function: Register(), Enter(), Display(), Haveit(), Giveit(), Start(), Show(),

(1 Mark for correct answer)

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

Answer:

70 bytes

(1 Mark for correct answer)

3.(a) Write a function TRANSFER(int A[], int B[], int Size) in C++ to create the elements of array B[] with the help of corresponding elements of array A[] i.e. If A[N] is positive number, B[N] should be 1, if A[N] is negative number B[N] should be –1, and if A[N] is zero B[N] should also be 0.   3

For example:

If the content of array A is

-98,56, 0,-23,-34,54

The content of array B should become

-1 , 1, 0, -1, -1, 1

Answer:

```
void TRANSFER(int A[],int B[],int Size)
{
        for(int i=0;i<Size;i++)
{
        if (A[i]<0)
                B[i]=-1;
        else if (A[I]>0)
                B[i]=1;
        else
                B[i]=0;
    }
}
```

(½ Mark for correct Function Header)

(1 Mark for correct formation of loop)

(1½ Mark for appropriate conditions and assignments in the loop)

(b) An array P[40][30] is stored in the memory along the row with each of the element occupying 4 bytes and the very first element has the memory location as 4500, find out the following:

(i) Memory location for the element P[10][20],

(ii) Total no. of bytes required by the array P in the memory. 3

Answer:

(i)

```
Given,
W=4
N=40
M=30
```

```
Base(P)=4500
Row Major Formula:
Loc(P[I][J])          =Base(S)+W*(M*I+J)
Loc(P[10][20])        =4500+4*(30*10+20)
                      =4500+4*(300+20)
                      =4500+1280
                      =5780
```

(1 Mark for writing correct formula (for row major) OR substituting formula
with correct values)
(½ Mark for writing calculation step – at least one step)
(½ Mark for correct address)

(ii)

```
Total no. of bytes required by the array P = (Total no. of elements in P) x (size of
each element in bytes)
                = 40 x 30 x 4
                = 4800 bytes
```

(1 Mark for calculating correct number of bytes)

(c)   Write a function in C++ to perform Insert operation in a static circular Queue
        containing Player's information (represented with the help of an array of struc-
        ture PLAYER).   4

```
struct PLAYER
{
        long PID; //Player ID
        char Pname[20]; //Player Name
};
```

```
Answer:
void QInsert(PLAYER P[], int F, int &R, int Size)
{
        if(R!=F)
        {
                R = (R+1)%Size;
                cin>>P[R].PID;
                gets(P[R].Pname);
        }
        else
        cout<<"Queue Full..."<<endl;
}
```

(1 Mark for correct function header)

(½ Mark for checking overflow)

(½ Mark for displaying overflow error message)

(1 Mark for incrementing Rear correctly for the static circular queue)

(½ Mark for correctly inputting PID of the inserted Player)

(½ Mark for correctly inputting Pname of the inserted Player)

(d)   Write a function TRANSFORM(int A[][3], int N, int M) in C++ to swap the elements of first and the last row.   2

Answer:

```
void TRANSFORM(int A[][3], int N, int M)
{
        //assuming N as number of rows
        //assuming M as number of columns
        for (int c=0; c<M; c++)
        {
                int T=A[0][c];
                A[0][c] = A[N-1][c];
                A[N-1][c] = T;
        }
}
```

(1 Mark for appropriate loop)

(1 Mark for correct swapping)

(e)   Evaluate the following POSTFIX notation. Show status of Stack after every step of evaluation (i.e. after each operator).   2

32, 4, /, 2, *, 12, 3, -, +

Answer:

Step 1: Push

32

Step 2: Push

4
32

Step 3: /

32

Pop
Op2=4

Pop
Op1=32
Op2=4

Push

8

Step 4: Push

```
┌──────┐
│      │
│  2   │
│  8   │
└──────┘
```

Step 5: *   Push

```
┌──────┐   Pop        ┌──────┐   Pop           ┌──────┐
│      │   Op2=2      │      │   Op1=8          │      │
│      │              │      │   Op2=2          │      │
│  8   │              │      │                  │  16  │
└──────┘              └──────┘                  └──────┘
```

Step 6: Push

```
┌──────┐
│      │
│  12  │
│  16  │
└──────┘
```

Step 7: Push

```
┌──────┐
│  3   │
│  12  │
│  16  │
└──────┘
```

Step 8: -   Push

```
┌──────┐   Pop        ┌──────┐   Pop           ┌──────┐
│      │   Op2=3      │      │   Op1=12         │      │
│  12  │              │      │   Op2=3          │  9   │
│  16  │              │  16  │                  │  16  │
└──────┘              └──────┘                  └──────┘
```

Step 9: +   Push

```
┌──────┐   Pop        ┌──────┐   Pop           ┌──────┐
│      │   Op2=9      │      │   Op1=16         │      │
│      │              │      │   Op2=9          │      │
│  16  │              │      │                  │  25  │
└──────┘              └──────┘                  └──────┘
```

Step 10: Pop

```
┌──────┐   Result
│      │   25
│      │
│      │
│      │
└──────┘
```

(½ Mark for correctly evaluating each operator)

4.   (a)   **Observe the program segment given below carefully and the questions that follow: 1**

```
#include <fstream.h>
class Book
{
        int Bno;char Title[20];
public:
        void EnterVal() {cin>>Bno; cin.getline(Title,20);
        void ShowVal() {cout<<Bno<<"#"<<Title<<endl;}
};
void Search(int RecNo)
{
        fstream File; Book B;
        File.open("BOOK.DAT",ios::binary|ios::in);
        _____              //Statement 1
        File.read((char*)&B,sizeof(B));
        B.ShowVal();
        File.close();
}
        void Modify(int RecNo)
{
        fstream File; Book B;
        File.open("BOOK.DAT",ios::binary|ios::in|ios::out);
        B.EnterVal();
        _____ //Statement 2
        File.write((char*)&B,sizeof(B));
        File.close();
}
```

(i)   **Write statement 1 to position the file pointer to the beginning of the desired record to be read, which is sent as parameter of the function (assuming RecNo 1 stands for the first record)**

(ii)   **Write statement 2 to position the file pointer to the beginning of the desired record to be modified, which is sent as parameter of the function (assuming RecNo 1 stands for the first record)**

Answer:

(i)	File.seekg((RecNo – 1) * sizeof(B)); //Statement 1
(ii)	File.seekp((RecNo – 1) * sizeof(B)); //Statement 2

(½ Mark for each correct Statement)

(b)   Write a function in C++ to count the word "this"(including "This"/"THIS" too) present in a text file "DIARY.TXT". 2

Answer:

```
void WordCount()
{
Fstream File;
File.open("DIARY.TXT", ios::in);
char Word[20];
int Count = 0;
```

```
while(!File.eof())
{
File>>Word;
if (!strcmp(Word,"this")|| !strcmp(Word,"This")||
!strcmp(Word,"THIS"))
Count++;
}
cout<<"Number of this/This/THIS = "<<Count<<endl;
File.close();
}
```

(½ Mark for opening DIARY.TXT correctly)

(½ Mark for initializing the counter and incrementing the counter)

(½ Mark for correctly reading a word from the file)

(½ Mark for comparing the word with the three given alternatives)

(c)   Write a function in C++ to search for a Toy having a particular ToyCode from a binary file "TOY.DAT" and display its details (Tdetails), assuming the binary file is containing the objects of the following class.   3

```
class TOYSHOP
{
int Tcode;            //Toy Code
char Tdetails[20];
public:
int RTcode(){return Tcode;}
void AddToy(){cin>>Tcode;gets(Tdetails);}
void DisToy(){cout<<Tcode<<Tdetails<<endl;}
};
```

Answer:

```
void ToySearch(int tc)
{
fstream FIL;
FIL.open("TOY.DAT",ios::binary|ios::in);
TOYSHOP TS;
int Found=0;
while (FIL.read((char*)&TS,sizeof(TS)))
{
if (TS.RTcode()==tc)
```

```
{
```

```
TS.DisToy();
Found++;
}
if (Found==0) cout<<"Sorry! Toy not found!!!"<<endl;
FIL.close();
}
```

(½ Mark for passing a code as a parameter or declaring and accepting its value inside the function)
(½ Mark for opening TOY.DAT correctly)
(½ Mark for reading each record from TOY.DAT)
(½ Mark for correct loop / checking end of file)
(½ Mark for comparing Toy code)
(½ Mark for displaying the matching record)

5. (a) **What do you understand by Degree and Cardinality of a table?** 2

Answer:

Degree: Total number of columns / attributes in a table is known as its Degree.

Cardinality: Total number of rows / tuples in a table is known as its Cardinality

Example:

Table: Employee

Eno	Name	Desig
34	Ankur Singh	Mgr
45	Jatin Dua	Dir
32	Ravina	Mgr
12	Harshit	Acc
01	Raj	Recp
09	Kirti	Mgr

For the above table Degree = 3 and Cardinality = 6

(1 mark for correct explanation of degree)
(1 mark for correct explanation of cardinality)

**Consider the following tables ACTIVITY and COACH
and answer (b) and (c) parts of this question:**

Table: ACTIVITY

ACode	ActivityName	Stadium	Participants Num	Prize Money	Schedule Date
1001	Relay 100x4	Star Annex	16	10000	23-Jan-2004
1002	High jump	Star Annex	10	12000	12-Dec-2003
1003	Shot Put	Super Power	12	8000	14-Feb-2004
1005	Long Jump	Star Annex	12	9000	01-Jan-2004
1008	Discuss Throw	Super Power	10	15000	19-Mar-2004

Table: COACH

PCode	Name	Acode
1	Ahmad Hussain	1001
2	Ravinder	1008
3	Janila	1001
4	Naaz	1003

(b)   Write SQL commands for the flowing statements: 4
(i) To display the names of all activities with their Acodes in descending order.

SELECT Acode, ActivityName FROM ACTIVITY ORDER BY Acode DESC;

(1 Mark for correct query)

OR

(½ Mark for partially correct answer)

(ii)   To display sum of PrizeMoney for the Activities played in each of the Stadium separately.

SELECT Stadium, SUM(PrizeMoney) FROM ACTIVITY GROUP BY Stadium;

(1 Mark for correct query)

OR

(½ Mark for partially correct answer)

(iii)   To display the coach's name and ACodes in ascending order of ACode from the table COACH

SELECT Name, Acode FROM COACH ORDER BY Acode;

(1 Mark for correct query)

OR

(½ Mark for partially correct answer)

(v) To display the content of the Activity table whose ScheduleDate earlier than 01/01/2004 in ascending order of ParticipantsNum.

```
SELECT * FROM ACTIVITY WHERE SchduleDate<'01-Jan-2004' ORDER BY
ParticipantsNum;
```

(1 Mark for correct query)

OR

(½ Mark for partially correct answer)

(c) Give the output of the following SQL queries: 2

(i)   SELECT COUNT(DISTINCT ParticipantsNum) FROM ACTIVITY;

```
3
```

(½ Mark for correct output)

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

MAX(ScheduleDate)	MIN(ScheduleDate)
19-Mar-2004	2-Dec-2003

(½ Mark for correct output)

(iii) SELECT Name, ActivityName FROM ACTIVITY A,COACH C
WHERE A.Acode=C.Acode AND A.ParticipantsNum=10;

NAME	ACTIVITYNAME
Ravinder	Discuss Throw

(½ Mark for correct output)

(iv) SELECT DISTINCT ParticipantsNum FROM ACTIVITY;

```
10
12
16
```

(½ Mark for correct output)

6.(a) State and verify Demorgan's Laws using truth table. 2
Answer:

For every X,Y $\in$ B

(i) (X+Y)' = X'.Y'

(ii) (X.Y)' = X' + Y'

Verification

(i)

X	Y	X+Y	(X+Y)'	X'	Y'	X'.Y'
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

Verified

(ii)

X	Y	X+Y	(X+Y)'	X'	Y'	X'.Y'
0	0	0	1	1	1	1
0	1	0	1	1	0	1
1	0	0	1	0	1	1
1	1	1	0	0	0	0

Verified

(1 Mark for stating the Demorgan's Laws)

(1 Mark for verifying the laws)

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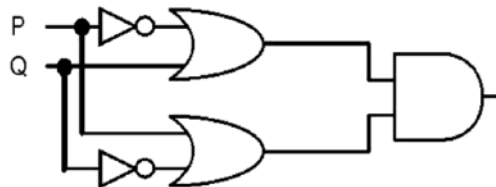
Answer:

F(P,Q)=(P'+Q).(P+Q')

(2 Marks for the final expression)

OR

(1 Mark for any one of the correct terms out of P'+Q or P+Q')

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

U	V	W	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

Answer:

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

(1 Mark for the correct POS expression)

(d) Reduce the following Boolean Expression using K-Map: 3
F(A,B,C,D)=∑ (0,1,2,4,5,6,8,10)
Answer:

	A'B'	A'	AB	AB'
C'D'	1 — 0	1 — 4	12	1 — 8
C'D	1 — 1	1 — 5	13	9
CD	3	7	14	11
CD'	1 — 2	1 — 6	15	1 — 10

F(A,B,C,D)=A'C'+A'D'+B'D'
(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) **What is VoIP?** 1

Answer:

VoIP is communication protocols and transmission technologies for delivery of voice communications and multimedia sessions over Internet Protocol (IP) networks, such

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as the Internet. Also, we can say, VoIP are IP telephony, Internet telephony and broad-band telephony.

(1 Mark for correct explanation)

b) Anuradha is a web developer. She has designed a login form to input the login id and password of the user. She has to write a script to check whether the login id and the corresponding password as entered by the user are correct or not. What kind of script from the following will be most suitable for doing the same?
(i) JSP   (ii) Client Side Script   (iii) VB Script 1

Answer:

(i) JSP

(1 Mark for correct answer)

c) Ramanathan's friend Suryansh visited his office for giving an invitation for his wedding. During the visit, he requested Ramanathan to let him work on his office computer to send an urgent mail. While working on the computer, Suryansh was tempted by seeing some important documents on the desktop and cleverly uploaded them to his Online Folder without taking his friend's consent (Suryansh did not even inform Ramanathan about this). What name from the following would you give to the above act committed by Suryansh?
(i) Trojan   (ii) Cyber Crime   (iii) Virus 1

Answer:

(ii) Cyber Crime

(1 Mark for correct answer)

d) What do you mean by IP Address? How is it useful in Computer Security? **1**

Answer:

An Internet Protocol (IP) address is a numerical identification and logical address that is assigned to devices connected in a computer network.
In a network every machine can be identified by a unique IP address associated with it and thus help in providing network security to every system connected in a network.

(½ Mark for meaning of IP Address)
(½ Mark for mentioning the usefulness in network security)

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e) 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
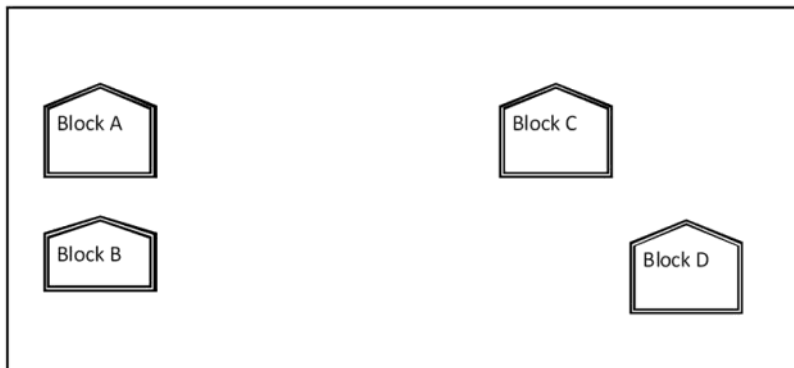
Center to center distances between various blocks

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

Number of Computers

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

e1) **Suggest a cable** layout of connections between the blocks.
Answers:
(Any of the following option)
Layout Option : 1
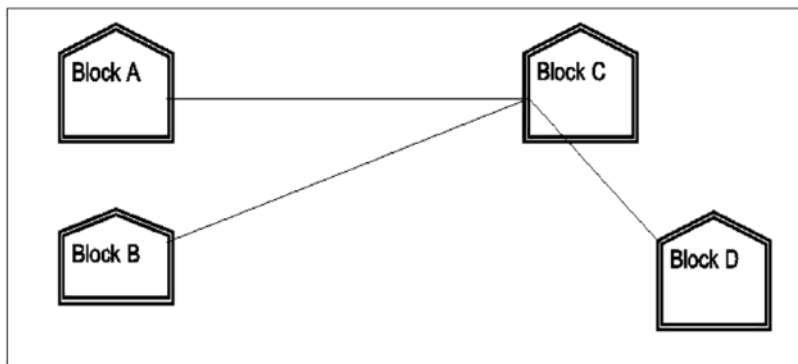
Layout Option 2: Since the distance between Block A and Block B is quite short
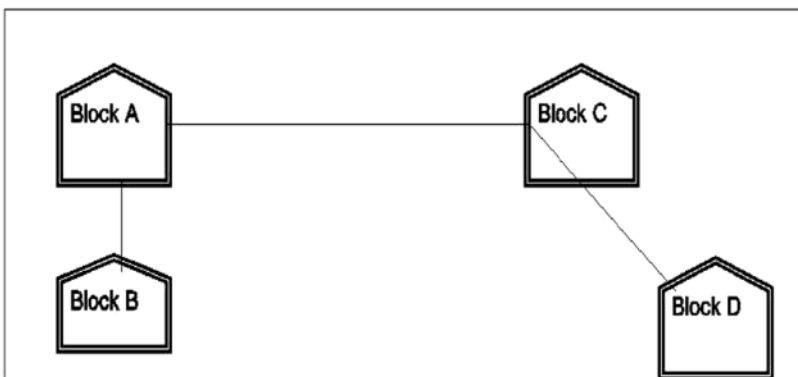
(1 Mark for showing any of the above suitable cable layout)

e2)   Suggest the most suitable place (i.e. block) 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 Block C, 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.

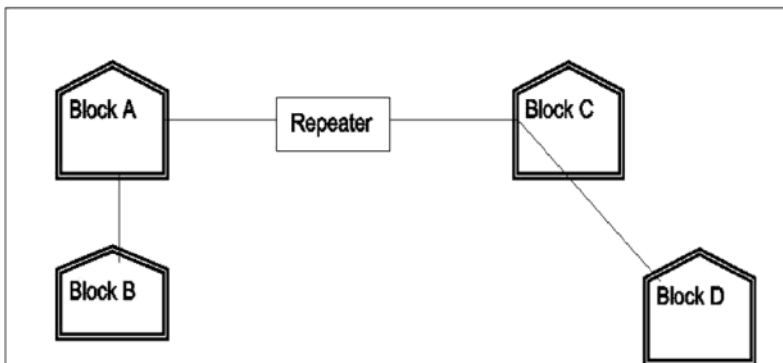(½ Mark for suggesting suitable place and ½ for appropriate reason)

e3)   Suggest the placement of the following devices with justification
     (i) Repeater
     (ii) Hub/Switch

Answer:

(i) For Layout 1, since the cabling distance between Blocks A and C, and that between B and C are quite large, so a repeater each, would ideally be needed along their path to avoid loss of signals during the course of data flow in these routes.

Block A — Repeater — Block C

Repeater
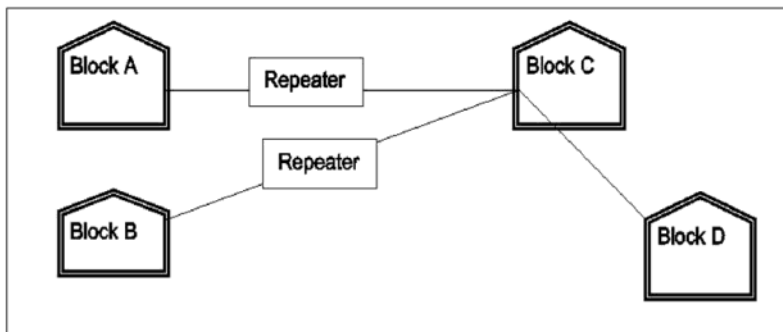
Block B

Block D

For layout 2, since the distance between Blocks A and C is large so a repeater would ideally be placed in between this path
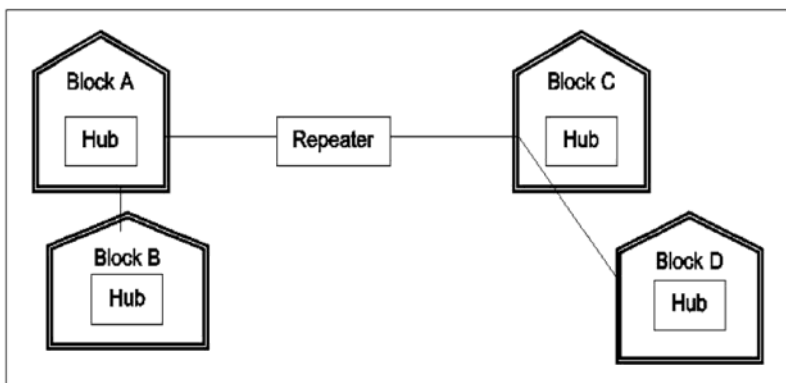
Block A — Repeater — Block C

Block B

Block D

(½ Mark for suggesting suitable place for connecting repeater)

(ii)   In both the layouts, a hub/switch each would be needed in all the blocks, to interconnect the group of cables from the different computers in each block

Layout 1
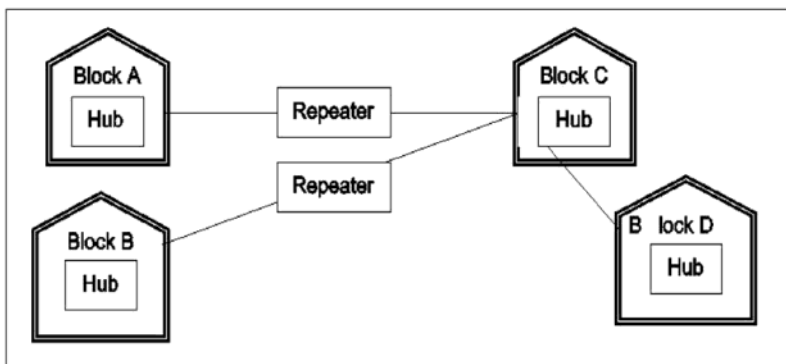
Layout 2

(½ Mark for suggesting suitable place for connecting hub)

e4)   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?

Answer:

The most economic way to connect it with a reasonable high speed would be to use radio wave transmission, as they are easy to install, can travel long distances, and penetrate buildings easily, so they are widely used for communication, both indoors and outdoors. Radio waves also have the advantage of being omni directional, which is they can travel in all the directions from the source, so that the transmitter and receiver do not have to be carefully aligned physically.

(1 Mark for appropriate answer)

e) What do you mean by Spam Mails? How can you protect your mailbox from Spams? **1**

Answer:

> Spam mails, also known as junk e-mail, is a subset of spam that involves nearly identical messages sent to numerous recipients by e-mail. We can protect our mailbox from spams by creating appropriate filters.

(½ Mark for the definition of Spam Mails)

(½ Mark for the appropriate suggestion for protecting mailbox from it)

f) Mention any two advantages of Open Source Software over Proprietary Software. **1**

Answer:

> Open Source's proponents often claim that it offers significant benefits when compared to typical Proprietary Software. Proprietary Software typically favour visible features (giving marketing advantage) over harder-to measure qualities such as stability, security and similar less glamorous attributes.
>
> Open Source Software developers are evidently motivated by many factors but favouring features over quality is not noticeable amongst them. For many developers, peer review and acclaim is important, so it's likely that they will prefer to build software that is admired by their peers. Highly prized factors are clean design, reliability and maintainability, with adherence to standards and shared community values preeminent.

(1 Mark for appropriate answer)