XII COMPUTER SCIENCE
CBSE Board - 2009

[Time allowed: 3hours] *[Maximum Marks :70]*

Instructions *(i) **All** questions are compulsory*
(ii) Programming Language: C++

1. (a) What is the difference between call by value and call by reference? Give an example in C++ to illustrate both. — 2

Ans

Call By Value	Call by reference
✓ Call by value is used to create a temporary copy of the data which is transferred from the actual parameter in the final parameter.	✓ Call by reference is used to share the same memory location for actual and formal parameters
✓ The changes done in the function in formal parameter are not reflected back in the calling environment.	✓ The changes done in the function are reflected back in the calling environment.
✓ It does not use & sign **Example:**	✓ It makes the use of the & sign as the reference operator. **Example**

```
#include <iostream.h>
void change(int x, int y)
{
   x = 10; /* change the value
              of x */
   y = 20; /* change the value
              of y */
}
void change(int x, int y);

void main ()
{
   // local variable
declaration:
   int a = 100;
   int b = 200;

   cout << "Before change,
value of a :" << a << endl;
   cout << "Before change,
value of b :" << b << endl;

   change(a, b);

   cout << "After change, value
of a :" << a << endl;
   cout << "After change, value
of b :" << b << endl;
```

```
#include <iostream.h>
void change(int *x, int *y)
{
   *x = 10; /* change the
value
            of x */
   *y = 20; /* change the
value
            of y */
}
void change(int *x, int *y);

void main ()
{
   // local variable
declaration:
   int a = 100;
   int b = 200;

   cout << "Before change,
value of a :" << a << endl;
   cout << "Before change,
value of b :" << b << endl;

   change(&a, &b);

   cout << "After change,
value of a :" << a << endl;
```

	} Value of a and b did not changed after over writing the value of x and y which contain the value of a and b. cout << "After change, value of b :" << b << endl; } Value of a and b is changed after over writing the value of x and y which contain the value of a and b.	
(b)	Write the names of the header files to which the following belong: (i) puts( ) (ii) sin( )	1
Ans	(i) stdio.h (ii) math.h	

(c)	Rewrite the following program after removing the syntactical error(s) (if any). Underline each correction.
	#include [iostream.h]
	#include [stdio.h]
	class Employee
	{
	int EmpId=901; char EName[20];
	public
	Employee( ) {}
	void Joinint( ) { cin>>EmpId; gets(EName); }
	void List( ) { cout<<EmpId<<":"<<EName<<endl;}
	};
	void main( )
	{
	Employee E; Joining.E( ); E.List( )
	}
		2

Ans	#include <iostream.h>
	#include <stdio.h>
	class Employee
	{
	int EmpId;
	char EName[20];
	public:
	Employee( )
	{}
	void Joinint( )
	{
	cin>>EmpId;
	gets(EName);
	}
	void List( )
	{	

```
            cout<<EmpId<<":"<<EName<<endl;
        }
};
void main( )
{
        Employee E;
        E.Joining( );
        E.List( )
}
```

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

```
#include<iostream.h>
void main()
{
    int X[]={10,25,30,55,110};
    int *p=X;
    while(*p<110)
    {
        if(*p%3!=0)
        *p=*p+1;
        else
        p++;
    }
    *p=*p+2;
    for(int I=4;I>=1;I--)
    {
        cout<<X[I]<<"*";
        if(I%3==0) cout<<endl;
    }
    cout<<X[0]*3<<endl;
}
```

Ans

112*57*

30*27*36

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

```
#include<iostream.h>
#include<ctype.h>
void Encode(char Info[ ], int N);
void main( )
{
    char Memo[ ] = "Justnow";
    Encode(Memo,2);
    cout<<Memo<<endl;
}
void Encode(char Info[ ], int N)
{
```

	for (int I=0;Info[I]!='\0';I++)
	if (I%2==0)
	Info[I]=Info[I]-N;
	else if (islower(Info[I]))
	Info[I] = toupper(Info[I]);
	else
	Info[I]=Info[I]+N;
	}	

Ans	HUqTlOu	

(f)	Study the following program and select the possible output from it:
	#include<iostream.h>
	#include<stdlib.h>
	void main( )
	{
	randomize( );
	int Points;
	Points = 100 + random(LIMIT);
	for (int P=Points; P>=100;P--)
	cout<<P<<"#";
	cout<<endl;
	}
	(i) 103#102#101#100# (ii) 100#101#102#103# (iii) 100#101#102#103#104# (iv) 104#103#102#101#100#
		2

Ans	(i) 103#102#101#100#	
2. (a)	What is copy constructor? Give an example in C++ to illustrate copy constructor.	2

Ans	A copy constructor is a special type of constructor that is used to create an object as a copy of an existing object. It takes an argument which is a reference to the object to be copied.
	Example:
	
	#include<iostream.h>
	#include<conio.h>
	class copy
	{
	int var,fact;
	public:
	copy(int temp)
	{
	var = temp;
	}
	double calculate()
	{
	fact=1;
	for(int i=1;i<=var;i++)	

```
                    {
                    fact = fact * i;
                    }
                    return fact;
            }
};
void main()
{
   clrscr();
   int n;
   cout<<"\n\tEnter the Number : ";
   cin>>n;
   copy obj(n);
   copy cpy=obj;
   cout<<"\n\t"<<n<<" Factorial is:"<<obj.calculate();
   cout<<"\n\t"<<n<<" Factorial is:"<<cpy.calculate();
   getch();
}
```

(b) Answer the question (i) and (ii) after going through the fo llowing class : 2

```
class WORK
{
      int WorkId; char WorkType;
public:
      ~WORK( )                        //Function 1
      {
            cout<<"Un-Allocated"<<endl;
      }
      void Status( )                   // Function 2
      {
            cout<<WorkId<<":"<<WorkType<<endl;
      }
      WORK( )                          // Function 3
      {
            WorkId=10; WorkType="T";
      }
      WORK (WORK &W)             // Function 4
      {
            WorkId = W.WorkId+12; WorkType=W.WorkType+1;
      }
};
```

(i) Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Work is called automatically, when the scope of an object gets over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

Ans Function 1

(ii)
 	
Ans
	Destructor
	WORK W; //Statement 1
	WORK Y(W); // Statement 2
	Which member function out of Function 1, Function 2, Function 3 and Function 4 shown in the above definition of class Work will be called on execution of statement written as Statement 2? What is this function specifically known as out of Destructor or Copy Constructor or Default Constructor?
	Function 4
	Copy Constructor	

(c)	Define a class RESORT in C++ with following description:
	Private Members:
	Rno // Data member to store Room No
	Name // Data member to store customer name
	Charges // Data member to store per day charges
	Days // Data member to store number of days of stay
	COMPUTE( ) // A function to calculate and return Amount as Days* Charges and if the value of Days * Charges is more than 11000 then as 1.02 * Days * Charges
	Public Members :
	Getinfo( ) // A function to enter the content Rno, Name, Charges and Days
	Dispinfo( ) // A function to display Rno, Name, Charges, Days and Amount (Amount to be displayed by calling function COMPUTE( ))
		4

Ans	class RESORT
	{
	int Rno;
	char Name[20];
	float Charges;
	int Days;
	float COMPUTE( );
	public:
	void Getinfo( );
	void Dispinfo( );
	};
	void RESORT:: Getinfo( )
	{
	cin>>Rno;
	gets(Name);
	cin>>Charges;	

```
        cin>>Days;
}
void RESORT:: Dispinfo( )
{
        cout<<Rno<<" "<<Name<<" "<<Charges<<"  "<<Days<<COMPUTE(
)<<endl;
}
 float RESORT:: COMPUTE( )
{
        float Amount = Charges * Days;
        if (Amount>11000)
              Amount = 1.02 * Days * Charges;
        return Amount;
}
```

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

```
class FaceToFace
{
      char CenterCode[10];
public:
      void Input( );void Output( );
};
class Online
{
      char website[50];
public:
      void SiteIn( );
      void SiteOut( );
};
class Training: public FaceToFace, private online
{
      long Tcode;
      float charge;
      int period;
public:
      void Register( );
      void show( );
};
```

(i) Which type of inheritance is shown in the above example?

Ans Multiple Inheritance

(ii) Write names of all the member functions accessible from Show( ) function of class Training.

Ans Register( ) Siteln( ), SiteOut( ); Input( ), Output( );

(iii) Write name of all the member accessible through an object of class Training.

Ans (iv)

Register( ), Show( ), Input( ), Output( ).

Is the function Output( ) accessible inside the function SiteOut( )? Justify your answer?

Ans.

No, function Output( ) is not accessible inside the function SiteOut( ), because Output( ) is a member of class FaceToFace and

SiteOut( ) is a member of class Online, and the classes FaceToFace and Online are two independent classes.

3. (a)

Write a function SORTPOINTS( ) in C++ to sort an array of structure Game in descending order of Points using Bubble Sort.

Note: Assume the following definition of structure Game

```
Struct Game
{
      long Pno;                    // Player Number char PName[20];
      long Points;
};
```

Sample Content of the array (before sorting)

PNo	Pname	Points
103	Ritika Kapur	3001
104	John Philip	2819
101	Razia Abbas	3451
105	Tarun	2971

Sample Content of the array (after sorting)

Pno	Pname	Points
101	Razia Abbas	3451
103	Ritika Kapur	3001
105	Tarun	2971
104	John Philip	2819

Ans

```
void SORTPOINTS(Game G[ ], int N)
{
      Game Temp;
      for (int I=0; I<N-1;I++)
         for (int J=0;J<N-I-1;J++)
             if (G[J].Points <G[J+1].Points)
             {
                  Temp = G[J];
                  G[J] = G[J+1];
                  G[J+1] = Temp;
             }
}
```

(b)

An array S[40][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the base address and address of element S[20][15], if an element S[15][10] is stored at the memory location 7200. 4

Ans

Address of S[i][j] along the column =Base Address + W [(i-L1) + (j-L2) * M)

Address of S[15][10] = Base Address + 4 [(15 - 1) + 10-1) x 40

	7200 = Base Address + 4 [374] Base Address = 7200 - (4 X 374) Base Address = 7200 - 1496 = 5704 Address of S[20][15] = 5704 + 4 ((20 - 1) + (15 - 1) x 40) = 5704 + 4 x 579 = 5704 + 2316 = 8020	

(c)	Write a function QUEINS( ) in C++ to insert an element in a dynamically allocated Queue containing nodes of the following given structure:
	struct Node
	{
	int PId; // Product Id char Pname[20];
	NODE *Next;
	};
		4

Ans	Class Queue
	{
	Node *Front, *Rear;
	public:
	QUEUE( ) // Constructor to initialize Front and Rear
	{
	Front = NULL;
	Rear = NULL;
	}
	void QUEINS( ); // Function to insert a node
	void QUEDEL( ); // Function to delete a node
	void QUEDISP( ); // Function to display nodes
	~Queue( ); //Destructor to delete all nodes
	};
	void Queue::QUEINS( )
	{
	Node *Temp;
	Temp = new Node;
	cin>> Temp->PId;
	gets(Temp->Pname);
	Temp->Next=NULL;
	if (Rear = = NULL)
	{
	Front = Temp;
	Rear = Temp;
	}
	else
	{
	Rear->Next = Temp;
	Rear = Temp;
	}
	}	

(d) Define a function SWAPCOL( ) in C++ to swap (interchange) the first column elements with the last column elements, for a two dimensional integer array passed as the argument of the function. 3

Example: If the two dimensional array contains

2	1	4	9
1	3	7	7
5	8	6	3
7	2	1	2

After swapping of the content of 1st column and last column, it should be:

9	1	4	2
7	3	7	1
3	8	6	5
2	2	1	7

Ans

```
void SWAPCOL(int A[ ][100], int M, int N)
{
   int Temp, I;
   for (I=0;I<M;I++)
   {
        Temp = A[I][0];
        A[I][0] = A[I][N-1];
        A[I][N-1] = Temp;
   }
}
```

(e) Convert the following infix expression to its equivalent postfix expression showing stack contents for the conversion: X - Y / (Z + U) * V 2

Ans

X - Y / (Z + U) * V

= (X - ((Y / (Z + U)) * V))

Element Scanned	Stack	Postfix
(		
X		X
-	-	
(		
(		
Y		XY
/	-/	
(		
Z		XYZ
+	-/+	
U		XYZU
)	-/	XYZU+
)	-	XYZU+/
*	-*	
V		XYZU+/V
)	-	XYZU+/V*
)		XYZU+/V*-

4
(a)
	Observe the program segment given below carefully and fill the blanks marked as Line 1 and Line 2 using fstream functions for performing the required task.
	#include<fstream.h>
	class Stock
	{
	long Ino; // Item Number
	char Item[20]; // Item Name
	int Qty; // Quantity
	public:
	void Get(int);
	Get(int);// Function to enter the content
	void Show( ); // Function to display the content
	void Purchase(int Tqty)
	{
	Qty+ = Tqty; // Function to increment in Qty
	}
	long KnowIno( )
	{ return Ino;}
	};
	void Purchaseitem(long PINo, int PQty)
	// PINo -> Info of the item purchased
	// PQty -> Number of items purchased
	{
	fstream file; File.open("ITEMS.DAT",ios::binary|ios::in|ios::cut); int Pos=-1;
	Stock S;
	while (Pos== -1 && File.read((char*)&S, sizeof(S)))
	if (S.KnowInc( ) == PINo)
	{
	S.Purchase(PQty); // To update the number of items
	Pos = File.tellg()- sizeof(S);
	//Line 1 : To place the file pointer to the required position
	_____;
	
	//Line 2 : To write the objects on the binary file
	_____;
	}
	if (Pos == -1)
	cout<<"No updation done as required Ino not found...";
	File.close( );
	}
		1

Ans	Line 1: File.seekp(Pos); Line 2: File.write((char*) &S, sizeof(S));	
(b)	Write a function COUNT_DO( ) in C++ to count the presence of a word „do" in a text file "MEMO.TXT".	

Example : If the content of the file "MEMO.TXT" is as follows:

I will do it, if you request me to do it.
It would have been done much
earlier.

The function COUNT_DO( ) will display the following message:

Count of -do- in flie: 2

Ans

```
void COUNT_TO( )
{
              ifstream Fi1("MEMO.TXT");
              char STR[10];
              int c=0;
              while(Fi1.getline(STR,10,' '))
             {
                  if (strcmpi(STR, "do") = = 0)
                  C++;
             }
             Fi1.close( );
             cout<<"Count to -do- in file: "<<c<<endl;
}
```

(c) Write a function in C++ to read and display the detail of all the users whose status is „A" (i.e. Active) from a binary file "USER.DAT". Assuming the binary file "USER.DAT" is containing objects of class USER, which is defined as follows:

```
class USER
{
      int Uid;                 // User Id
      char Uname[20];          // User Name
      char Status;             // User Type: A Active I Inactive public:
      void Register( );        // Function to enter the content
      void show( );            // Function to display all data members
      char Getstatus( )
      {
           return Status;
      }
};
```

Ans

```
void DisplayActive( )
 {
              USER U;
              ifstream fin;
              fin.open("USER.DAT", ios:: binary);
              while (fin.read( ( char*) &U, sizeof(U)))
              {
                        if (U.Getstatus( ) = = 'A')
                        U.show( );
             }
            fin.close( );       // Ignore
}
```

5

(a) What are candidate keys in a table? Give a suitable example of candidate keys in a table. 2

Ans

- ✓ A candidate key is a combination of attributes that can be uniquely used to identify a database record without any extraneous data. Each table may have one or more candidate keys. One of these candidate keys is selected as the table primary key.

- ✓ A table can easily have 2 or more candidate keys: for example, consider this table for hotel room reservations:

CREATE TABLE reservation (reservation_no INTEGER NOT NULL, room_no INTEGER NOT NULL , from_date DATE NOT NULL , to_date DATE NOT NULL);

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

Table: GARMENT

GCODE	DESCRIPTION	PRICE	FCODE	READYDATE
10023	PENCIL SKIRT	1150	F03	19-DEC-08
10001	FORMAL SHIRT	1250	F01	12-JAN-08
10012	INFORMAL	1550	F02	06-JAN-08
10024	BABY TOP	750	F03	07-APR-07
10090	TULIP SKIRT	850	F02	31-MAR-07
10019	EVENING GOWN	850	F03	06-JUN-08
10009	INFORMAL PANT	1500	F02	20-OCT-08
10007	FORMAL PANT	1350	F01	09-MAR-08
10020	FROCK	850	F04	09-SEP-07
10089	SLACKS	750	F03	31-OCT-08

Table: FABRIC

FCODE	TYPE
F04	POLYSTER
F02	COTTON
F03	SILK
F01	TERELENE

(i) To display GCODE and DESCRIPTION of each GARMENT in descending order of GCODE

Ans SELECT GCODE, DESCRIPTION FROM GARMENT ORDER BY GCODE DESC;

(ii) To display the details of all the GARMENTs, which have READYDATE in between 08-DEC-07 and 16-JUN-08 (inclusive of both the dates).

Ans SELECT * FROM GARMENT WHERE READYDATE BETWEEN '08-DEC-07' AND '16-JUN-08';

(iii) To display the average PRICE of all the GARMENTs, which are made up of FABRIC with FCODE as F03.

Ans: SELECT AVG(PRICE) FROM GARMENT WHERE FCODE = 'F03';

Ans

(iv) To display FABRICwise highest and lowest price of GARMENTs from GARMENT table. (Display FCODE of each GARMENT along with highest and lowest price).

Ans

```
SELECT FCODE, MAX(PRICE), MIN(PRICE) FROM GARMENT GROUP BY
FCODE;
```

(v)

```
SELECT SUM(PRICE) FROM GARMENT WHERE FCODE="F01";
```

Ans

```
SUM(PRICE)
      2600
```

(vi)

```
SELECT DESCRIPTION, TYPE FROM GARMENT, FABRIC WHERE
GARMENT.FCODE =FABRIC.FCODE AND GARMENT.PRICE > = 1260;
```

Ans

```
DESCRIPTION              TYPE

INFORMAL SHIRT       COTTON
INFORMAL PANT        COTTON
FORMAL PANT          TERELENE
```

(vii)

```
SELECT MAX(FCODE) FROM FABRIC;
```

Ans

```
MAX(FCODE)
    F04
```

(viii)

```
SELECT COUNT (DISTINCT PRICE) FROM GARMENT;
```

Ans

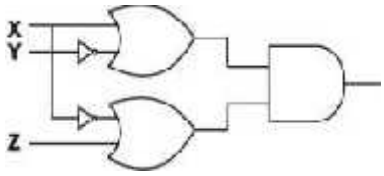
```
COUNT(DISTINCT PRICE)
      7
```

6 (a) Verify X'Y + X.Y' + X'.Y' = (X'+Y') using truth table. 2

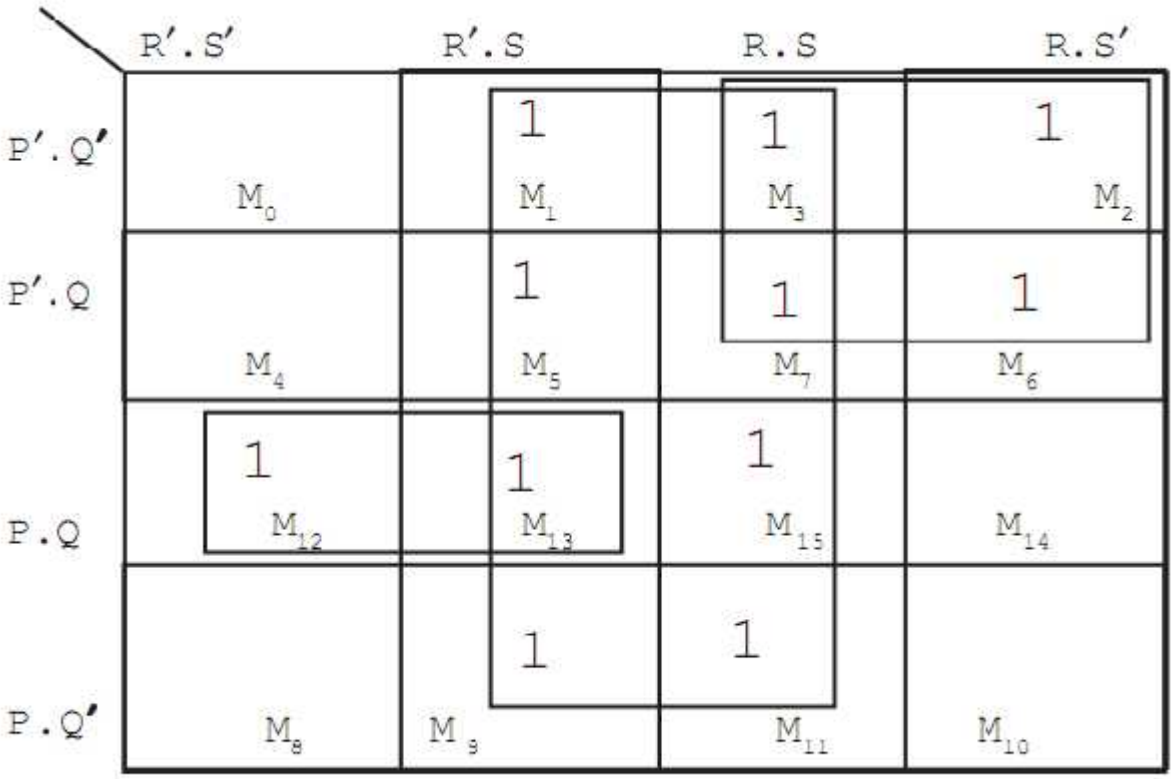
Ans

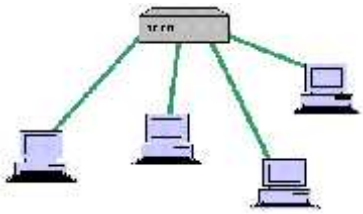
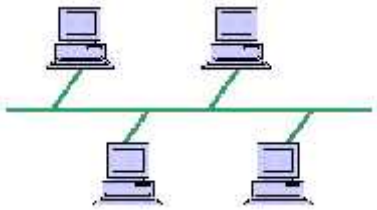
X	Y	X'	Y'	X'.Y	XY'	X'Y'	X'Y+XY'+X'Y'	X'+Y'
0	0	1	1	0	0	1	1	1
0	1	1	0	1	0	0	1	1
1	0	0	1	0	1	0	1	1
1	1	0	0	0	0	0	0	0

HENCE PROVED.

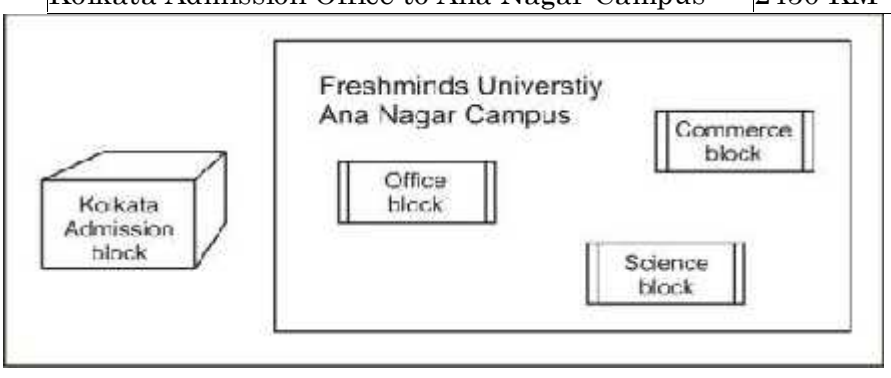
(b)	 Write the equivalent Boolean Expression for the following Logic Circuit:	2
Ans	(X+Y').(X'+Z)	
(c)	Write the POS form of a Boolean Function H, which represented in a truth table as follows:	2

A	B	C	H
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Ans	(A+B+C).(A'+B+C').(A'+B'+C)	
(d)	Reduce the following Boolean Expression using K-Map: F(P, Q, R, S) = ∑(1, 2, 3, 5, 6, 7, 9, 11, 12, 13, 15)	3
Ans:	 Resultant Expression: S + P'R + P.Q.R'	

7. (a)	What is the difference between STAR topology and BUS topology of network?	
Ans	STAR TOPOLOGY • In star topology every computer is connected with the host computer & much wire is require. • If any client computer tops working it will not affect the whole network.  BUS TOPOLOGY • In bus topology computers are connected with each other by a wire in a approximately strait manner. • If one computer stops working the whole network will stop. 	
(b)	Expand the following abbreviations: (i) GSM (ii) CDMA	2
Ans	(i) GSM: Global System for Mobile (ii) CDMA: Code Division Multiple Access.	
(c)	What is protocol? Which protocol is used to search information from Internet using the Internet Browser?	1
Ans	Protocol – A network protocol is a set of rules and conventions for communication between network devices. Every computer must follow same protocol for their network. The most common protocol used by internet is TCP/IP. By the help of TCP/IP and HTTP protocols we can search information from Internet using the Internet Browser.	
(d)	Name two switching techniques used to transfer data between two terminals (computers).	1
Ans	(i) Message Switching (ii) Packet Switching	
(e)	Freshminds University of India is starting its first campus in Ana Nagar of South India with its center admission office in Kolkata. The University has 3 major blocks comprising of office block, science block and commerce block in the 5 KM area campus. As network experts, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distances and other given parameters. Expected Wire distances between various locations:	4

Office Block to Science Block	90 m
Office Block to Commerce Block	80 m
Science Block to Commerce Block	15 m
Kolkata Admission Office to Ana Nagar Campus	2450 KM



Expected number of Computers to be installed at various locations in the university are as follows:

Office Block	10
Science Block	140
Commerce Block	30
Kolkata Admission Office	8

Suggest the authorities, the cable layout amongst various blocks inside university campus for connecting the blocks.

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

(E1) Suggest an efficient device from the following to be installed in each of the blocks to connect all the computers: (i) MODEM (ii) SWITCH (iii) GATEWAY

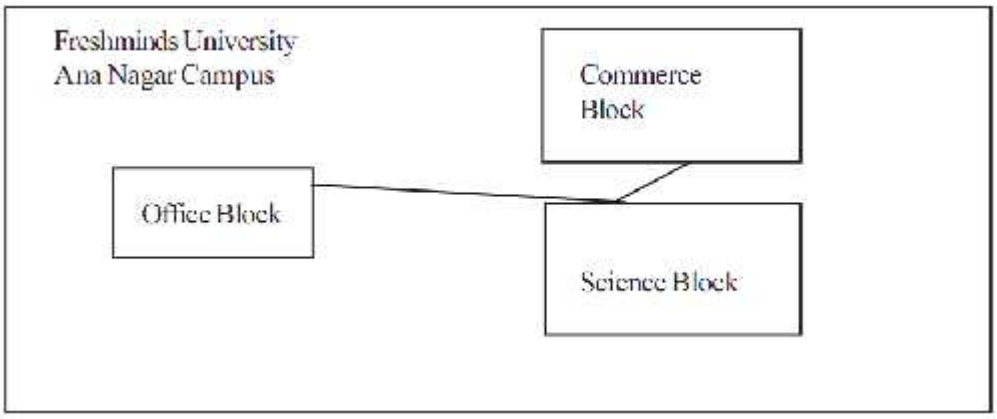
Suggest the most suitable (very high speed) device to provide data connectivity between Admission Office located in Kolkata and the Campus located in Ana Nagar from the following options:

(E2)
- Telephone Line
- Fixed- Line Dial-up connection
- Co-axial Cable Network

(E3)
- GSM
- Leased Line
- Satellite Connection

(E4)

Ans E1



Ans E2 Science Block as it contains maximum number of computers.

Ans E3 SWITCH

Ans E4 Satellite Connection

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