Class XII
Computer Science (083)

Time allowed: 3 Hours **Max. Marks: 70**

General Instructions:

(a) All questions are compulsory.

(b) Programming Language with C++

(c) *In Question 2(b, d) ,3 and 4 has internal choices.*

Q. No.	Part	Question Description	Marks
1	(a)	Write the type of C++ Operators (Arithmetic, Logical, and Relational Operators) from thefollowing: (i) !(ii) !=(iii) &&(iv) %	(2)

	(b)	Observe the following program very carefully and write the name of those header file(s), which are essentially needed to compile and execute thefollowing program successfully:
		void main()
		{
		char text[20], newText[20];
		gets(text);
		strcpy(newText,text);
		for(int i=0;i<strlen(text);i++)
		if(text[i] = ='A')
		text[i] = text[i]+2;
		puts(text);
		}
			(1)

	(c)	Rewrite the following C++ code after removing any/all Syntactical Error(s) with each correction underlined.
		
		Note: Assume all required header files are already being included in the program.
		
		#define float PI 3.14
		void main( )
		{
		float R=4.5,H=1.5;
		A=2*PI*R*H + 2*PIpow(R,2);
		cout<<'Area='<<A<<endl;
		}
			(2)

	(d)	Find and write the output of the following C++ program code:
		Note: Assume all required header files are already being included in the program.
		void main( )
		{
		int Ar[ ] = { 6 , 3 , 8 , 10 , 4 , 6 , 7} ;
		int *Ptr = Ar , I ;
		cout<<++*Ptr++ << '@' ;
		I = Ar[3] - Ar[2] ;
		cout<<++*(Ptr+I)<<'@'<<"\n" ;
		cout<<++I + *Ptr++ << '@' ;
		cout<<*Ptr++ <<'@'<< '\n' ;
		for(; I >=0 ; I -=2)
		cout<<Ar[I] << '@' ;
		}
			(3)

	(e)	Find and write the output of the following C++ program code:
		typedef char STRING[80];
		void MIXNOW(STRING S)
		{
		int Size=strlen(S);
		for(int I=0;I<Size;I+=2)
		{
		char WS=S[I];
		S[I]=S[I+1];
		S[I+1]=WS;
		}
		for (I=1;I<Size;I+=2)
		if (S[I]>='M' && S[I]<='U')
		S[I]='@';
		}
		void main()
		{
		STRING Word="CBSEEXAM2019";
		MIXNOW(Word);
		cout<<Word<<endl;
		}
			(2)

	(f)	Observe the following program and find out, which output(s) out of (i) to (iv) willbe expected from the program? What will be the minimum and the maximum value assigned to the variable Alter?
		
		Note: Assume all required header files are already being included in the program.
		void main( )
		{
		randomize();
		int Ar[]={10,7}, N;
			(2)

```
                int Alter=random(2) + 10 ;
                for (int C=0;C<2;C++)
                {
                        N=random(2) ;
                        cout<<Ar[N] +Alter<<"#";
                }
        }
```

(i) 21#20# (ii) 20#18#
(iii) 20#17# (iv) 21#17#

2 (a) What is a copy constructor? Illustrate with a suitable C++ example. (2)

(b) Write the output of the following C++ code. Also, write the name of feature of Object Oriented Programming used in the following program jointly illustrated by the Function 1 to Function 4. (2)

```
        void My_fun ( )                          // Function 1
        {
                for (int I=1 ; I<=50 ; I++) cout<< "-" ;
                cout<<end1 ;
        }
        void My_fun (int N)                      // Function 2
        {
                for (int I=1 ; I<=N ; I++) cout<<"*" ;
                cout<<end1 ;
        }
        void My_fun (int A, int B)               // Function 3
        {
                for (int I=1. ;I<=B ;I++) cout <<A*I ;
                cout<<end1 ;
        }
        void My_fun (char T, int N)              // Function 4
        {
                for (int I=1 ; I<=N ; I++) cout<<T ;
                cout<<end1;
        }
        void main ( )
        {
                int X=7, Y=4, Z=3;
                char C='#' ;
                My_fun (C,Y) ;
                My_fun (X,Z) ;
}
```

OR

(b) Write any four differences between Constructor and Destructor function with respect to object oriented programming.

	(c)	Define a class Ele_Bill in C++ with the following descriptions: **Private members:** Cname — of type character array Pnumber — of type long No_of_units — of type integer Amount — of type float. Calc_Amount( ) — This member function should calculate the amount as No_of_units*Cost . Amount can be calculated according to the following conditions: **No of units Cost** First 50 units — Free Next 100 units — 0.80 @ unit Next 200 units — 1.00 @ unit Remaining units — 1.20 @ unit **Public members:** * A function Accept( ) which allows user to enter Cname, Pnumber, No_of_units and invoke function Calc_Amount(). * A function Display( ) to display the values of all the data members on the screen.	(4)

	(d)	Answer the questions (i) to (iv) based on the following:
		class Faculty
		{
		int FCode;
		protected:
		char FName[20];
		public:
		Faculty();
		void Enter();
		void Show();
		};
		class Programme
		{
		int PID;
		protected:
		char Title[30];
		public:
		Programme();
		void Commence();
		void View();
		};
		class Schedule: public Programme, Faculty
		{
		int DD,MM,YYYY;
		public:
			(4)

```
        Schedule();
        void Start();
        void View();
};
void main()
{
        Schedule S;             //Statement 1
        _____                   //Statement 2
}
```

(i) Write the names of all the member functions, which are directly accessible by the object S of class Schedule as declared in main() function.

(ii) Write the names of all the members, which are directly accessible by the memberfunction Start( ) of class Schedule.

(iii) Write Statement 2 to call function View( ) of class Programme from the object S of class Schedule.

(iv) What will be the order of execution of the constructors, when the object S of class Schedule is declared inside main()?

OR

(d) Consider the following class State :

```
class State
{
protected :
int  tp;
public :
State( ) { tp=0;}
void  inctp( ) { tp++;};
int  gettp(); { return  tp; }
};
```

Write a code in C++ to publically derive another class 'District' with the following additional members derived in the public visibility mode.

Data Members :

Dname	string
Distance	float
Population	long int

Member functions :

DINPUT( ) : To enter Dname, Distance and population

DOUTPUT( ) : To display the data members on the screen.

3	(a)	Write a user-defined function AddEnd4(int A[][4],int R,int C) in C++ to find and display the sum of all the values, which are ending with 4 (i.e., unit place is 4). For example if the content of array is: 24 16 14 19 5 4 The output should be 42	(2)
		OR	
	(a)	Write a user defined function in C++ to find the sum of both left and right diagonal elements from a two dimensional array.	
	(b)	Write a user-defined function EXTRA_ELE(int A[ ], int B[ ], int N) in C++ to find and display the extra element in Array A. Array A contains all the elements of array B but one more element extra. (Restriction: array elements are not in order) Example If the elements of Array A is 14, 21, 5, 19, 8, 4, 23, 11 and the elements of Array B is 23, 8, 19, 4, 14, 11, 5 Then output will be 21	(3)
		OR	
	(b)	Write a user defined function Reverse(int A[],int n) which accepts an integer array and its size as arguments(parameters) and reverse the array. Example : if the array is 10,20,30,40,50 then reversed array is 50,40,30,20,10	
	(c)	An array S[10] [30] is stored in the memory along the column with each of its element occupying 2 bytes. Find out the memory location of S[5][10], if element S[2][15] is stored at the location 8200.	(3)
		OR	
	(c)	An array A[30][10] is stored in the memory with each element requiring 4 bytes of storage ,if the base address of A is 4500 ,Find out memory locations of A[12][8], if the content is stored along the row.	
	(d)	Write the definition of a member function Ins_Player() for a class CQUEUE in C++, to add a Player in a statically allocated circular queue of PLAYERs considering the following code is already written as a part of the program: struct Player { long Pid; char Pname[20];	(4)

		};
		const int size=10;
		class CQUEUE
		{
		Player Ar[size];
		int Front, Rear;
		public:
		CQUEUE( )
		{
		Front = -1;
		Rear = -1;
		}
		void Ins_Player(); // To add player in a static circular queue
		void Del_Player(); // To remove player from a static circular queue
		void Show_Player(); // To display static circular queue
		};	

		OR	

	(d)	Write a function in C++ to delete a node containing Books information ,from a dynamically allocated stack of Books implemented with the help of the following structure:
		struct Book
		{
		int BNo;
		char BName[20];
		Book *Next;
		};	

	(e)	Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion. A/B+C*(D-E)	(2)
		OR	
		Evaluate the following Postfix expression : 4,10,5,+,*,15,3,/,-	
4	(a)	Write a function RevText() to read a text file " Input.txt " and Print only word starting with 'I' in reverse order . **Example: If value in text file is: INDIA IS MY COUNTRY** **Output will be: AIDNI SI MY COUNTRY**	(2)
		OR	
	(a)	Write a function in C++ to count the number of lowercase alphabets present in a text file "BOOK..txt".	

(b) Write a function in C++ to search and display details, whose destination is "Cochin" from binary file "Bus.Dat". Assuming the binary file is containing the objects of the following class: (3)

```
class BUS
{          int Bno;                    // Bus Number
           char From[20];              // Bus Starting Point
           char To[20];                // Bus Destination
         public:
           char * StartFrom ( ); { return From; }
           char * EndTo( ); { return To; }
           void input() { cin>>Bno>>; gets(From); get(To); }
           void show( ) { cout<<Bno<< ":"<<From << ":" <<To<<endl; }
};
```

OR

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

```
class STU
{
int Rno;
char Sname[20];
public: void Enter()
{
cin>>Rno;gets(Sname);
}
void show()
{
count << Rno<<sname<<endl;
}
};
```

(c) Find the output of the following C++ code considering that the binary file PRODUCT.DAT exists on the hard disk with a list of data of 500 products. (1)

```
class PRODUCT
{
                int PCode;char PName[20];
        public:
                void Entry();void Disp();
};
void main()
{
        fstream In;
        In.open("PRODUCT.DAT",ios::binary|ios::in);
        PRODUCT P;
        In.seekg(0,ios::end);
        cout<<"Total Count: "<<In.tellg()/sizeof(P)<<endl;
```

```
        In.seekg(70*sizeof(P));
        In.read((char*)&P, sizeof(P));
        In.read((char*)&P, sizeof(P));
        cout<<"At Product:"<<In.tellg()/sizeof(P) + 1;
        In.close();
}
```

OR

(c) Which file stream is required for seekg() ?

5 (a) Observe the following table and answer the parts(i) and(ii) accordingly (2)

Table:Product

Pno	Name	Qty	PurchaseDate
101	Pen	102	12-12-2011
102	Pencil	201	21-02-2013
103	Eraser	90	09-08-2010
109	Sharpener	90	31-08-2012
113	Clips	900	12-12-2011

(i) Write the names of most appropriate columns, which can be considered as candidate keys.

(ii) What is the degree and cardinality of the above table?

(b) Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables. (4+2)

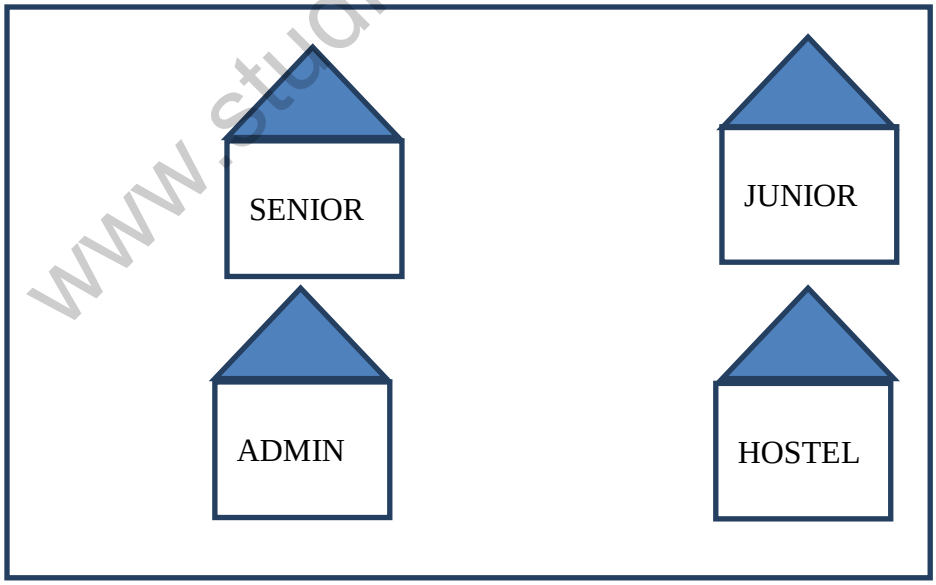
TRAINER

TID	TNAME	CITY	HIREDATE	SALARY
101	SUNAINA	MUMBAI	1998-10-15	90000
102	ANAMIKA	DELHI	1994-12-24	80000
103	DEEPTI	CHANDIGARG	2001-12-21	82000
104	MEENAKSHI	DELHI	2002-12-25	78000
105	RICHA	MUMBAI	1996-01-12	95000
106	MANIPRABHA	CHENNAI	2001-12-12	69000

COURSE

CID	CNAME	FEES	STARTDATE	TID
C201	AGDCA	12000	2018-07-02	101
C202	ADCA	15000	2018-07-15	103
C203	DCA	10000	2018-10-01	102
C204	DDTP	9000	2018-09-15	104
C205	DHN	20000	2018-08-01	101
C206	O LEVEL	18000	2018-07-25	105

	(i)	Display the Trainer Name, City & Salary in descending order of their Hiredate.	
	(ii)	To display the TNAME and CITY of Trainer who joined the Institute in the month of December 2001.	
	(iii)	To display TNAME, HIREDATE, CNAME, STARTDATE from tables TRAINER and COURSE of all those courses whose FEES is less than or equal to 10000.	
	(iv)	To display number of Trainers from each city.	
	(v)	SELECT TID, TNAME, FROM TRAINER WHERE CITY NOT IN('DELHI', 'MUMBAI');	
	(vi)	SELECT DISTINCT TID FROM COURSE;	
	(vii)	SELECT TID, COUNT(*), MIN(FEES) FROM COURSE GROUP BY TID HAVING COUNT(*)>1;	
	(viii)	SELECT COUNT(*), SUM(FEES) FROM COURSE WHERE STARTDATE< '2018-09-15';	
6	(a)	State any one Distributive Law of Boolean Algebra and Verify it using truth table.	(2)
	(b)	Draw the Logic Circuit of the following Boolean Expression: ((U + V').(U + W)). (V + W')	(2)
	(c)	Derive a Canonical SOP expression for a Boolean function F(X,Y,Z) represented by the following truth table: X Y Z F(X,Y,Z) 0 0 0 1 0 0 1 1 0 1 0 0 0 1 1 0 1 0 0 1 1 0 1 0 1 1 0 0 1 1 1 1	(1)
	(d)	Reduce the following Boolean Expression to its simplest form using K-Map: **F(X,Y,Z,W)= Σ (0,1,2,3,4,5,8,10,11,14)**	(3)

7	(a)	Arun opened his e-mail and found that his inbox was full of hundreds of unwanted mails. It took him around two hours to delete these unwanted mails and find the relevant ones in his inbox. What may be the cause of his receiving so many unsolicited mails? What can Arun do to prevent this happening in future?	(2)
	(b)	Assume that 50 employees are working in an organization. Each employee has been allotted a separate workstation to work. In this way, all computers are connected through the server and all these workstations are distributed over two floors. In each floor, all the computers are connected to a switch. Identify the type of network?	(1)
	(c)	Your friend wishes to install a wireless network in his office. Explain him the difference between guided and unguided media.	(1)
	(d)	Write the expanded names for the following abbreviated terms used in Networking and Communications: (i) CDMA (ii) HTTP (iii) XML (iv) URL	(2)
	(e)	Multipurpose Public School, Bangluru is Setting up the network between its Different Wings of school campus. There are 4 wings namedasSENIOR(S),JUNIOR(J),ADMIN(A)andHOSTEL(H). Multipurpose Public School, Bangluru  	(4)

Distancebetweenvariouswingsaregivenbelow:

WingAtoWingS	100m
WingAtoWingJ	200m
WingAtoWingH	400m
WingStoWingJ	300m
WingStoWingH	100m
WingJtoWingH	450m

Number of Computers installed at various wings are as follows:

Wings	NumberofComputers
WingA	20
WingS	150
WingJ	50
WingH	25

(i)	Suggest the best wired medium and draw the cable layout to efficiently connect various wings of Multipurpose PublicSchool, Bangluru.
(ii)	Namethe most suitablewing wherethe Servershouldbe installed.Justifyyour answer.
(iii)	Suggest a device/software and its placement that would provide data security for the entire network of the School.
(iv)	Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the campus of Multipurpose Public School, Bangluru.

Marking Scheme
COMPUTER SCIENCE (Code: 083)

CLASS:-XII

Time:3 Hrs. **M.M.:70**

Q. No.	Part	Question Description	Marks
1	(a)	Write the type of C++ Operators (Arithmetic, Logical, and Relational Operators) from the following: (i) !(ii) !=(iii) &&(iv) %	2
	Ans.	(i) Logical (ii) Relational (iii)Logical (iv) Arithmetic	
		(1/2 Mark for each correct Operator Type)	

	(b)	Observe the following program very carefully and write the name of those header file(s), which are essentially needed to compile and execute thefollowing program successfully:
		void main()
		{
		char text[20], newText[20];
		gets(text);
		strcpy(newText,text);
		for(int i=0;i<strlen(text);i++)
		if(text[i]==’A’)
		text[i]=text[i]+2;
		puts(text);
		}
			1

	Ans.	• stdio.h • string.h	
		(½ Mark for writing each correct header file) NOTE: Any other header file to be ignored	

	(c)	Rewrite the following C++ code after removing any/all Syntactical Error(s) with each correction underlined.
		Note: Assume all required header files are already being included in the program.
		#define float PI 3.14
		void main( )
		{
		float R=4.5,H=1.5;
		A=2*PI*R*H + 2*PIpow(R,2);
		cout<<‘Area=’<<A<<endl;
		}
			(2)

```
#define PI 3.14//Error 1
void main( )
{
        float  R=4.5,H=1.5;
        floatA=2*PI*R*H + 2*PI*pow(R,2);          //Error 2, 3
        cout<<"Area="<<A<<endl;                    //Error 4
}
```

(½ Mark for each correction)
OR
(1 mark for identifying the errors, without suggesting corrections)

(d) Find and write the output of the following C++ program code: (3)

Note: Assume all required header files are already being included in the program.

```
void main( )
{
        int Ar[ ] = { 6 , 3 , 8 , 10 , 4 , 6 , 7} ;
        int *Ptr = Ar , I ;
cout<<++*Ptr++ << '@' ;
I = Ar[3] - Ar[2] ;
cout<<++*(Ptr+I)<<'@'<<"\n" ;
cout<<++I + *Ptr++ << '@' ;
cout<<*Ptr++ <<'@'<< '\n' ;
for( ; I >=0 ; I -=2)
        cout<<Ar[I] << '@' ;
}
```

Ans

```
7@11@
6@8@
11@3@
```

(½ Mark for writing each correct value)
OR
(Only ½ Mark for writing all '@' at proper places)
Note:
- Deduct only ½ Mark for not considering any or all correct placements of @
- Deduct only ½ Mark for not considering any or all line break

(e) Find and write the output of the following C++ program code: (2)

```
typedef char STRING[80];
void MIXNOW(STRING S)
{
   int Size=strlen(S);
   for(int I=0;I<Size;I+=2)
   {
                char WS=S[I];
```

		S[I]=S[I+1];
		S[I+1]=WS;
		}
		for (I=1;I<Size;I+=2)
		if (S[I]>='M' && S[I]<='U')
		S[I]='@';
		}
		void main()
		{
		STRING Word="CBSEEXAM2019";
		MIXNOW(Word);
		cout<<Word<<endl;
		}	

	Ans.	BCE@XEMA0291	
		(2 Marks for correct output) OR (½ Mark for each of two correct consecutive alphabets not exceeding 1½ marks)	

	(f)	Observe the following program and find out, which output(s) out of (i) to (iv) willbe expected from the program? What will be the minimum and the maximum value assigned to the variable Alter?
		Note: Assume all required header files are already being included in the program.
		void main( )
		{
		randomize();
		int Ar[]={10,7}, N;
		int Alter=random(2) + 10 ;
		for (int C=0;C<2;C++)
		{
		N=random(2) ;
		cout<<Ar[N] +Alter<<"#";
		}
		}
		(i) 21#20# (ii) 20#18#
		(iii) 20#17# (iv) 21#17#
			(2)

	Ans.	The output expected from the program is (iii) 20#17# Minimum Value of Alter = 10 Maximum Value of Alter = 11	
		(1 Mark for writing correct option (iii)) (½ Mark for writing correct Minimum Value of Alter) (½ Mark for writing correct Maximum Value of Alter)	

23	(a)	What is a copy constructor? Illustrate with a suitable C++ example.	(2)

	Ans.	A copy constructor is an overloaded constructor in which an object of the same class is passed as reference parameter.
		class X
		{
		int a;
		public:
		X()
		{
		a=0;
		}
		X(X &ob) //copy constructor
		{
		a=ob.a;
		}
		};
		
		(Full 2 Marks to be awarded if the copy constructor is explained with an appropriate example)
		
		OR
		
		(1 Mark for correct explanation of copy constructor only without an example)	

	(b)	Write the output of the following C++ code. Also, write the name of feature of Object Oriented Programming used in the following program jointly illustrated by the Function 1 to Function 4.
		
		void My_fun ( ) // Function 1
		{
		for (int I=1 ; I<=50 ; I++) cout<< "-" ;
		cout<<end1 ;
		}
		void My_fun (int N) // Function 2
		{
		for (int I=1 ; I<=N ; I++) cout<<"*" ;
		cout<<end1 ;
		}
		void My_fun (int A, int B) // Function 3
		{
		for (int I=1. ;I<=B ;I++) cout <<A*I ;
		cout<<end1 ;
		}
		void My_fun (char T, int N) // Function 4
		{
		for (int I=1 ; I<=N ; I++) cout<<T ;
		cout<<end1;
			(2)

```
        }
        void main ( )
        {
                int X=7, Y=4, Z=3;
                char C='#' ;
                My_fun (C,Y) ;
                My_fun (X,Z) ;
}
```

OR

Write any four differences between Constructor and Destructor function with respect to object oriented programming

Ans.

####
71421
Polymorphism
OR
Function Overloading

OR

Constructor	Destructor
Name of the constructor function is same as that of class	Name of the destructor function is same as that of class preceded by ~
Constructor functions are called automatically at the time of creation of the object	Destructor functions are called automatically when the scope of the object gets over
Constructor can be overloaded	Destructor ca not be overloaded
Constructor is used to initialize the data members of the class	Destructor is used to de- initialize the data members of the class

(½ Mark for writing each correct line of output)
(1 Mark for writing the feature name correctly)

OR

(½ Mark for writing each correct difference)

(c) Define a class Ele_Bill in C++ with the following descriptions: (4)

Private members:

Cname	of type character array
Pnumber	of type long
No_of_units	of type integer
Amount	of type float.
Calc_Amount( )	This member function should calculate the amount asNo_of_units*Cost .

Amount can be calculated accordingto the following conditions:

No_of_units Cost

First 50 units	Free
Next 100 units	0.80 @ unit
Next 200 units	1.00 @ unit
Remaining units	1.20 @ unit

Public members:

* A function Accept( ) which allows user to enter Cname, Pnumber, No_of_units and invoke function Calc_Amount().
* A function Display( ) to display the values of all the data members on the screen.

Ans.

```
class Ele_Bill
{
    char Cname[20];
    long Pnumber;
    int No_of_units;
    float Amount;
    void Calc_Amount( );
  public:
    void Accept();
    void Display();
};

    void Ele_Bill : : Calc_Amount( )
    {
            if(No_of_units<=50)
            {
                Amount=0;
}
else if(No_of_units<=150)
             {
                Amount=(No_of_units-50)*0.80;
}
            else if(No_of_units<=350)
             {
                Amount=80+(No_of_units-150)*1.00;
}
              else
              {
                Amount=80+200+(No_of_units-350)*1.20;
              }
       }
  void Ele_Bill :: Accept( )
```

```
{
        gets(Cname);
        cin>Pnumber>>No_of_units;
        Calc_Amount( );
 }
 void Ele_Bill :: Display( )
{
        cout<<Cname<<Pnumber<<No_of_units<<Amount;
}
```

(½ Mark for declaring class header correctly)
(½ Mark for declaring data members correctly)
(1 Mark for defining Calc_Amount() correctly)
(½ Mark for taking inputs of Cname, Pnumber and No_of_units in Accept())
(½ Mark for invoking Calc_Amount() inside Accept())
(½ Mark for defining Display() correctly)
(½ Mark for correctly closing class declaration with a semicolon ;)

NOTE:
Marks to be awarded for defining the member functions inside or outside the class

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

```
class Faculty
{
   int FCode;
protected:
        char FName[20];
public:
        Faculty();
        void Enter();
        void Show();
};
class Programme
{
        int PID;
protected:
        char Title[30];
public:
        Programme();
        void Commence();
        void View();
};
class Schedule: public Programme, Faculty
{
        int DD,MM,YYYY;
public:
        Schedule();
```

```
        void Start();
        void View();
};
void main()
{
        Schedule S;             //Statement 1
        _____                   //Statement 2
}
```

OR

Consider the following class State :

```
class State
{
protected :
int  tp;
public :
State( ) { tp=0;}
void  inctp( ) { tp++;};
int  gettp(); { return  tp; }
};
```

Write a code in C++ to publically derive another class 'District' with the following additional members derived in the public visibility mode.

Data Members :

Dname	string
Distance	float
Population	long int

Member functions :

DINPUT( ) : To enter Dname, Distance and population

DOUTPUT( ) : To display the data members on the screen.

(i) Write the names of all the member functions, which are directly accessible by the object S of class Schedule as declared in main() function.

Ans. Start(), Schedule::View(), Commence(), Programme::View()

(1 Mark for writing all correct member names)

NOTE:

- Ignore the mention of Constructors

(ii) Write the names of all the members, which are directly accessible by the memberfunction Start( ) of class Schedule.

Ans. DD,MM,YYYY, Schedule::View()
Title, Commence( ), Programme::View()
Fname, Enter(), Show()

(1 Mark for writing all correct member names)

		NOTE: ● Marks not to be awarded for partially correct answer ● Ignore the mention of Constructors
	(iii)	Write Statement 2 to call function View( ) of class Programme from the object S of class Schedule.
	Ans.	S.Programme::View( );
		(1 Mark for writing Statement 2 correctly)
	(iv)	What will be the order of execution of the constructors, when the object S of class Schedule is declared inside main()?
	Ans.	Programme( ), Faculty( ), Schedule( )
		OR

	Ans.	class District : public State
		{
		public :
		char Dname[20];
		float Distance;
		long int Population;
		void DINPUT( )
		{
		gets(Dname);
		cin>>distance;
		cin>>Population;
		}
		void DOUTPUT( )
		{
		cout<<Dname<<endl;
		cout<<Distance<<endl;
		cout<<population<<endl;
		}
		};

		(1 Mark for writing correct order) ● No Marks to be awarded for any other combination/order. ● Names of the constructor/class without parenthesis is acceptable
		OR
		(1 Mark for correct syntax for derived class header) (½ Mark for writing public :) (½ Mark for correct declaration of data members Dname ,Distance and Population) (1 Mark for defining the function DINPUT( )) (1 Mark for defining the function DOUTPUT( ))

	(a) Ans.	Write a user-defined function AddEnd4(int A[][4],int R,int C) in C++ to find and display the sum of all the values, which are ending with 4 (i.e., unit place is 4). For example if the content of array is: 24 16 14 19 5 4 The output should be 42	(2)
		OR	
		Write a user defined function in C++ to find the sum of both left and right diagonal elements from a two dimensional array.	

		void AddEnd4(int A[ ][4], int R, int C)
		{
		int I,J,sum=0;
		for(I=0;I<R;I++)
		{
		for(J=0;J<C;J++)
		if(A[I][J]%10 ==4)
		sum=sum+A[I][J];
		}
		cout<<sum;
		}	

		OR	

		void Diagsumboth(int A[][4], int n)
		{
		int sumLt=0,sumRt=0;
		for(int i=0;i<n;i++)
		{
		sumLt+=A[i][i];
		else
		sumRt+=A[n-1-i][i];
		}
		cout<<"sum of left diagonal"<<sumlt<<endl;
		cout<<"sum of right diagonal"<<sumRt<<endl;
		}	

		(½ Mark for correct loops) (½ Mark for correct checking values ending with 4) (½ Mark for finding sum of values) (½ Mark for displaying the sum)	
		OR	
		(1/2 Mark for correct loop) (1/2 Mark each for calculating sum of left or right diagonals) (1/2 Mark for displaying)	

	(b)	Write a user-defined function EXTRA_ELE(int A[ ], int B[ ], int N) in C++ to find and display the extra element in Array A. Array A contains all the elements of array B but one more element extra. (Restriction: array elements are not in order) Example If the elements of Array A is 14, 21, 5, 19, 8, 4, 23, 11 and the elements of Array B is 23, 8, 19, 4, 14, 11, 5 Then output will be 21	(3)
		OR	
		Write a user defined function Reverse(int A[],int n) which accepts an integer array and its size as arguments(parameters) and reverse the array. **Example : if the array is 10,20,30,40,50 then reversed array is 50,40,30,20,10**	

	Ans.	void EXTRA_ELE(int A[], int B[],int N)
		{
		int i,j,flag=0;
		for(i=0;i<N;i++)
		{
		for(j=0;j<N;j++)
		{
		if(A[i]==B[j])
		{
		flag=1;
		break;
		}
		}
		if(flag==0)
		cout<<"Extra element"<<A[i];
		flag=0;
		}
		}	

		OR	

		void Reverse(int A[ ] , int n)
		{
		int temp;
		for(int i=0;i<n/2;i++)
		{
		temp=A[i];
		A[i]=A[n-1-i];
		A[n-1-i]=temp;
		}
		}	

		(1 Mark for correct loops) (1 Mark for checking array elements which are equal) (½ Mark for display the extra element)	

		OR	
		(1 Mark for correct loop) (2 Marks for swapping elements)	
	(c)	An array S[10] [30] is stored in the memory along the column with each of its element occupying 2 bytes. Find out the memory location of S[5][10], if element S[2][15] is stored at the location 8200.	(3)
		OR	
		An array A[30][10] is stored in the memory with each element requiring 4 bytes of storage ,if the base address of A is 4500 ,Find out memory locations of A[12][8], if the content is stored along the row.	
	Ans.	**OPTION 1:** ASSUMING LBR=LBC=0 W=2 BYTES, NUMBER OF ROWS(M)=10, NUMBER OF COLUMNS(N)=30 LOC(S[I][J]) = B +(I + J*M)*W LOC(S[2][15]) = B +(2+15*10)* 2 8200 = B + (152*2) B = 8200 - 304 B = 7896 LOC(S[5][10]) = 7896 +(5+10*10)* 2 = 7896 + (105*2) = 7896 + 210 = 8106 **OPTION 2:** ASSUMING LBR=2,LBC=15 AND B = 8200 W=2 BYTES, NUMBER OF ROWS(M)=10, NUMBER OF COLUMNS(N)=30 LOC(S[I][J]) = B +((I-LBR) + (J-LBC)*M)*W LOC(S[5][10])= 8200 + ((5-2) + (10-15)*10)*2 = 8200 + (3 + (-5)*10) * 2 = 8200 + (3 + (-50)) * 2 = 8200 + (3 – 50) * 2 = 8200 + (-47) * 2 = 8200 – 94 = 8106	
		OR	
		Loc of A[12][8]= B+W*(N*(I-LBR)+(J-LBC)) =4500+4*(10*12+8) = 4500 4*(128) =4500 + 512 = 5012	

		1 Mark for writing correct formula (for column major) OR substituting formula with correct values) (1 Mark for correct step calculations) (1 Mark for final correct address)	
		OR	
		1 Mark for writing correct formula (for Row major) OR substituting formula with correct values) (1 Mark for correct step calculations) (1 Mark for final correct address)	

	(d)	Write the definition of a member function Ins_Player() for a class CQUEUE in C++, to add a Player in a statically allocated circular queue of PLAYERs considering the following code is already written as a part of the program:
		struct Player
		{
		long Pid;
		char Pname[20];
		};
		const int size=10;
		class CQUEUE
		{
		Player Ar[size];
		int Front, Rear;
		public:
		CQUEUE( )
		{
		Front = -1;
		Rear=-1;
		}
		void Ins_Player(); // To add player in a static circular queue
		void Del_Player(); // To remove player from a static circular queue
		void Show_Player(); // To display static circular queue
		};
			(4)

		OR	

		Write a function in C++ to delete a node containing Books information ,from a dynamically allocated stack of Books implemented with the help of the following structure:
		struct Book
		{
		int BNo;
		char BName[20];
		Book *Next;
		};	

Ans.

```
void CQUEUE : : Ins_Player( )
{
        if((Front==0 && Rear==size-1) || (Front==Rear+1)
        {
                cout<< "Overflow";
                return;
         }
        else if(Rear = = -1)
        {
                Front=0;
                Rear=0;
         }
         else if(Rear= =size-1)
        {
                 Rear=0;
         }
         else
         {
                 Rear++;
         }
     cout<< "Enter Player Id=";
     cin>>Ar[Rear].Pid;
     cout<< "Enter Player Name=";
     gets(Ar[Rear].Pname);
}
```

OR

```
struct Book
{
int BNo;
char BName[20];
Book *Next;
}*temp,*top;


void pop()
{
temp=new Book ;
temp=top;
top=top->next;
delete temp;
}
```

(1 Mark for checking if Queue is Full)
(1 Mark for checking if Queue is Empty)
(½ Mark for checking Rear is at size-1)
(½ Mark for incrementing Rear)
(½ Mark for assigning Values to the Rear location of the Queue)

OR

(1 Mark for creating new node Book)
(1 Mark for assigning top to temp)
(1 Mark for top=top->next)
(1 Mark for delete top)

(e) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion. (2)

A/B+C*(D-E)

OR

Evaluate the following Postfix expression :

4,10,5,+,*,15,3,/,-

Ans:

Element	Stack	Postfix
A		A
/	/	A
B	/	AB
+	+	AB/
C	+	AB/C
*	+*	AB/C
(	+*(	AB/C
D	+*(	AB/CD
-	+*(-	AB/CD
E	+*(-	AB/CDE
)	+*	AB/CDE-
	+	AB/CDE-*
		AB/CDE-*+

OR

55

(½ Mark for conversion upto each operator illustrating through stack)

OR

(1/2 Mark for evaluating each operator)

4 (a) Write a function RevText() to read a text file " Input.txt " and Print only word starting with 'I' in reverse order . (2)

Example: If value in text file is: INDIA IS MY COUNTRY
Output will be: AIDNI SI MY COUNTRY

OR

Write a function in C++ to count the number of lowercase alphabets present in a text file "BOOK..txt".

	Ans.	void RevText( )
		{
		ifstream Fin("Input.txt");
		char Word[20];
		while(!Fin.eof())
		{
		Fin>>Word;
		if(Word[0]=='I')
		strrev(Word);
		cout<<Word<< " ";
		}
		Fin.close( );
		}	

		OR	

		int Countalpha()
		ifstream ifile ("BOOK.txt");
		char ch;
		int count =0;
		while (! ifile.eof())
		{
		ifile.get(ch);
		if(isfower(ch))
		count ++;
		}
		ifile.close();
		return (count)
		}	

		(½ Mark for opening Input.txt correctly) (½ Mark for reading each Word from the file) (½ Mark for checking the word starting with 'I') (½ Mark for reversing and displaying the word)	
		OR	
		(½ Mark for opening Input.txt correctly) (½ Mark for reading each character from the file) (½ Mark for checking the lower character) (½ Mark for displaying the count)	

	(b)	Write a function in C++ to search and display details, whose destination is "Cochin" from binary file "Bus.Dat". Assuming the binary file is containing the objects of the following class:
		class BUS
		{ int Bno; // Bus Number
		char From[20]; // Bus Starting Point
			(3)

```
            char To[20];                    // Bus Destination
        public:
char * StartFrom ( ); { return From; }
            char * EndTo( ); { return To; }
            void input() { cin>>Bno>>; gets(From); get(To); }
            void show( ) { cout<<Bno<< ":"<<From << ":" <<To<<endl; }
};
```

OR

Write a function in C++ to add more new objects at the bottom of a binary file "STUDENT.dat", assuming the binary file is containing the objects of the following class :

```
class STU
{
int Rno;
char Sname[20];
public: void Enter()
{
cin>>Rno;gets(Sname);
}
void show()
{
count << Rno<<sname<<endl;
}
};
```

Ans.

```
void Read_File( )
{
      BUS B;
      ifstream Fin;
      Fin.open("Bus.Dat", ios::binary);
      while(Fin.read((char *) &B, sizeof(B)))
      {
            if(strcmp(B.EndTo(), "Cochin")==0)
            {
                  B.show( )  ;
            }
      }
      Fin.close( );
}
```

OR

```
void Addrecord()
{
ofstream ofile;
ofile.open("STUDENT.dat", ios ::out);
STU S;
char ch='Y';
while (Ch=='Y' || Ch = = 'y')
{
```

```
S.Enter();
ofile.write (Char*) & S, sizeof(s));
cout << "more (Y/N)";
cin>>ch;
}
ofile.close();
}
```

(½ Mark for opening Bus.Dat correctly)
(1 Mark for reading each record from Bus.Dat)
(1 Mark for comparing value returned by EndTo( ) with “Cochin”)
(½ Mark for displaying the matching record)

OR

(1 Mark for opening STUDENT.Dat correctly)
(1 Mark for S.Enter())
(1 Mark for writing each record into the file)

(c) Find the output of the following C++ code considering that the binary file PRODUCT.DAT exists on the hard disk with a list of data of 500 products. (1)

```
class PRODUCT
{
        int PCode;char PName[20];
    public:
        void Entry();void Disp();
};
void main()
{
    fstream In;
    In.open("PRODUCT.DAT",ios::binary|ios::in);
    PRODUCT P;
    In.seekg(0,ios::end);
    cout<<"Total Count: "<<In.tellg()/sizeof(P)<<endl;
    In.seekg(70*sizeof(P));
    In.read((char*)&P, sizeof(P));
    In.read((char*)&P, sizeof(P));
    cout<<"At Product:"<<In.tellg()/sizeof(P) + 1;
    In.close();
}
```

OR

Which file stream is required for seekg() ?

Ans. Total Count:500
At Product: 73

OR

fstream/ ifstream

(½ Mark for each correct value of In.tellg()/sizeof(P) as 500 and 73 respectively)

OR

(1 Mark for correct stream)

5 (a) Observe the following table and answer the parts(i) and(ii) accordingly (2)

Table:Product

Pno	Name	Qty	PurchaseDate
101	Pen	102	12-12-2011
102	Pencil	201	21-02-2013
103	Eraser	90	09-08-2010
109	Sharpener	90	31-08-2012
113	Clips	900	12-12-2011

(i) Write the names of most appropriate columns, which can be considered as candidate keys.

Ans. Candidate Key: Pno, Name

(1 Mark for writing correct Candidate Keys)

(ii) What is the degree and cardinality of the above table?

Ans. Degree:4
Cardinality:5

(½ Mark for writing correct value of degree)
(½ Mark for writing correct value of cardinality)

(b) Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables. (4+2)

TRAINER

TID	TNAME	CITY	HIREDATE	SALARY
101	SUNAINA	MUMBAI	1998-10-15	90000
102	ANAMIKA	DELHI	1994-12-24	80000
103	DEEPTI	CHANDIGARG	2001-12-21	82000
104	MEENAKSHI	DELHI	2002-12-25	78000
105	RICHA	MUMBAI	1996-01-12	95000
106	MANIPRABHA	CHENNAI	2001-12-12	69000

COURSE

CID	CNAME	FEES	STARTDATE	TID
C201	AGDCA	12000	2018-07-02	101
C202	ADCA	15000	2018-07-15	103
C203	DCA	10000	2018-10-01	102
C204	DDTP	9000	2018-09-15	104
C205	DHN	20000	2018-08-01	101
C206	O LEVEL	18000	2018-07-25	105

	(i)	Display the Trainer Name, City & Salary in descending order of their Hiredate.
	Ans.	SELECT TNAME, CITY, SALARY FROM TRAINER ORDER BY HIREDATE;
		(½ Mark for SELECT TNAME, CITY, SALARY FROM TRAINER) (½ Mark for ORDER BY HIREDATE)
	(ii)	To display the TNAME and CITY of Trainer who joined the Institute in the month of December 2001.
	Ans.	SELECT TNAME, CITY FROM TRAINER WHERE HIREDATE BETWEEN '2001-12-01' AND '2001-12-31'; OR SELECT TNAME, CITY FROM TRAINER WHERE HIREDATE >= '2001-12-01' AND HIREDATE<='2001-12-31'; OR SELECT TNAME, CITY FROM TRAINER WHERE HIREDATE LIKE '2001-12%';
		(½ Mark for SELECT TNAME, CITY FROM TRAINER) (½ Mark for WHERE HIREDATE BETWEEN '2001-12-01' AND '2001-12-31' OR WHERE HIREDATE >= '2001-12-01' AND HIREDATE<='2001-12-31 OR WHERE HIREDATE LIKE '2001-12%'
	(iii)	To display TNAME, HIREDATE, CNAME, STARTDATE from tables TRAINER and COURSE of all those courses whose FEES is less than or equal to 10000.
	Ans.	SELECT TNAME,HIREDATE,CNAME,STARTDATE FROM TRAINER, COURSE WHERE TRAINER.TID=COURSE.TID AND FEES<=10000;

		(1 Mark for correct query) OR (½ Mark for correct SELECT) (½ Mark for correct WHERE Clause)	
	(iv)	To display number of Trainers from each city.	
	Ans.	SELECT CITY, COUNT(*) FROM TRAINER GROUP BY CITY;	
		(1 Mark for correct query) OR (½ Mark for correct SELECT) (½ Mark for GROUP BY CITY)	
	(v)	SELECT TID, TNAME, FROM TRAINER WHERE CITY NOT IN('DELHI', 'MUMBAI');	
	Ans.	TIDTNAME 103 DEEPTI 106 MANIPRABHA	
		(½ Mark for correct output)	
	(vi)	SELECT DISTINCT TID FROM COURSE;	
	Ans.	DISTINCT TID 101 103 102 104 105	
		(½ Mark for correct output)	
	(vii)	SELECT TID, COUNT(*), MIN(FEES) FROM COURSE GROUP BY TID HAVING COUNT(*)>1;	
	Ans.	TIDCOUNT(*)MIN(FEES) 101 2 12000	
		(½ Mark for correct output)	
	(viii)	SELECT COUNT(*), SUM(FEES) FROM COURSE WHERE STARTDATE< '2018-09-15';	
	Ans.	COUNT(*)SUM(FEES) 4 65000	
		(½ Mark for correct output)	

6 (a) State any one Distributive Law of Boolean Algebra and Verify it using truth table. (2)

Ans.

Distributive Law:
A+BC=(A+B)(A+C)
Verification

A	B	C	BC	A+BC	(A+B)	(A+C)	(A+B)(A+C)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

OR
A(B+C)=AB+AC

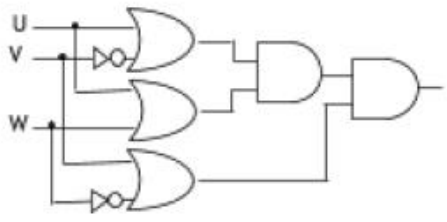
A	B	C	B+C	A(B+C)	AB	AC	AB+AC
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

(1 Mark for stating any one Distributive Law correctly)
(1 Mark for correctly verifying the stated Law using Truth Table)

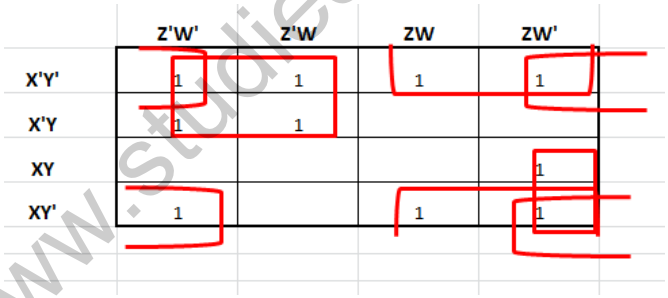
(b) Draw the Logic Circuit of the following Boolean Expression: (2)

((U + V').(U + W)). (V + W')

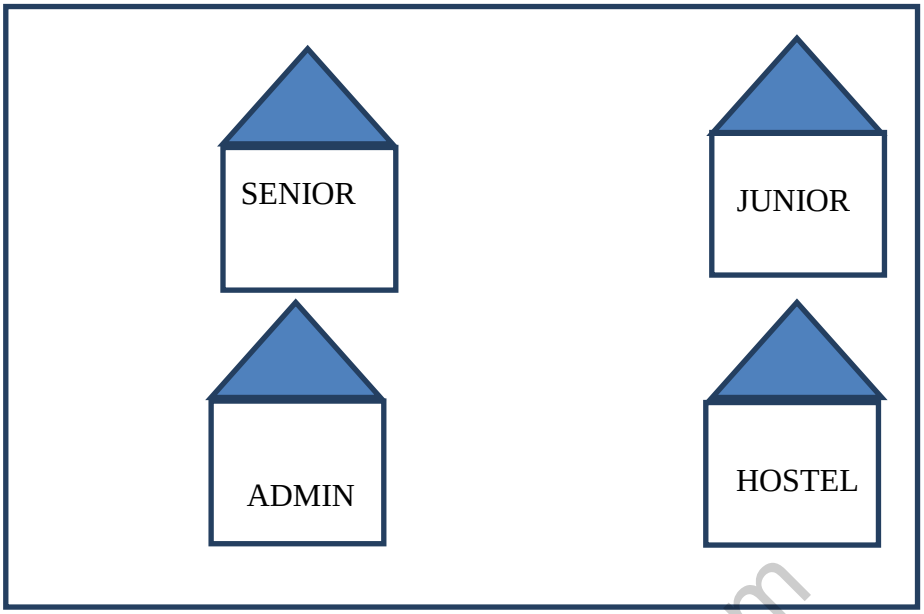
Ans.



(c) Derive a Canonical SOP expression for a Boolean function F(X,Y,Z) represented by the following truth table: (1)

		<table><tr><th>X</th><th>Y</th><th>Z</th><th>F(X,Y,Z)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>0</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><tr><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>	
	Ans.	F(X,Y,Z)= X'Y'Z'+X'Y'Z+XY'Z'+XYZ OR F(X,Y,Z)=∑(0,1,4,7)	
		(1 Mark for the correct SOP form) OR (½ Mark for writing any two term correctly)	
	(d)	Reduce the following Boolean Expression to its simplest form using K-Map: **F(X,Y,Z,W)= Σ (0,1,2,3,4,5,8,10,11,14)**	(3)
		 **Simplified Expression: X'Z'+Y'W'+Y'Z+XZW'**	
		(½ Mark for drawing K-Map and correctly plotting 1s in the given cells) (½ Mark each for 4 groupings) (½ Mark for writing final expression in reduced/minimal form) Note: ● Deduct ½ mark if wrong variable names are used	
7	(a)	Arun opened his e-mail and found that his inbox was full of hundreds of unwanted mails. It took him around two hours to delete these unwanted mails and find the relevant ones in his inbox. What may be the cause of his receiving so many unsolicited mails? What can Arun do to prevent this happening in future?	(2)

	Ans.	Arun's email has been attacked with spam. These may be promotional mails from different advertisement groups. Arun must have checked some promotional offers while surfing the Internet. He should create filters in his email to stop receiving these unwanted mails. (1 Mark for writing correct Answer) (1 Mark for writing correct Justification to prevent Spam)	
	(b)	Assume that 50 employees are working in an organization. Each employee has been allotted a separate workstation to work. In this way, all computers are connected through the server and all these workstations are distributed over two floors. In each floor, all the computers are connected to a switch. Identify the type of network?	(1)
	Ans.	LAN(Local Area Network) (1 Mark for writing correct Answer)	
	(c)	Your friend wishes to install a wireless network in his office. Explain him the difference between guided and unguided media.	(1)
	Ans.	Guided media uses cables to connect computers, whereas unguided media uses waves. (1 Mark for writing any correct difference between guided and unguided media)	
	(d)	Write the expanded names for the following abbreviated terms used in Networkingand Communications: (i) CDMA (ii) HTTP (iii) XML (iv) URL	(2)
	Ans.	(i) Code Division Multiple Access (ii) Hyper Text Transfer Protocol (iii) Extensible Markup Language (iv) Uniform Resource Locator (½ Mark for writing each correct expansion)	
	(e)	Multipurpose Public School, Bangluru is Setting up the network between its Different Wings of school campus. There are 4 wings namedasSENIOR(S),JUNIOR(J),ADMIN(A)andHOSTEL(H). Multipurpose Public School, Bangluru	(4)



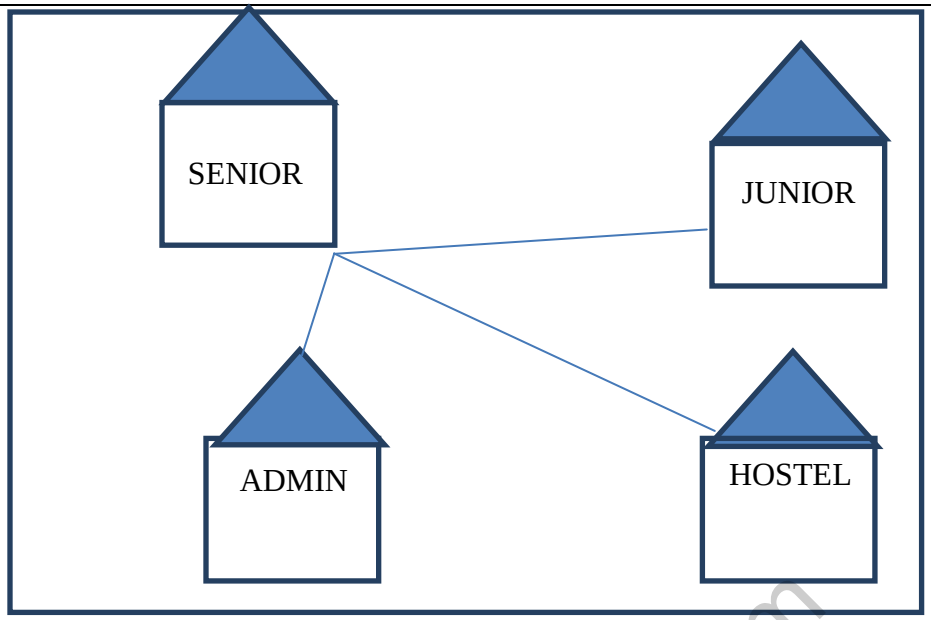
Distance between various wings are given below:

WingAtoWingS	100m
WingAtoWingJ	200m
WingAtoWingH	400m
WingStoWingJ	300m
WingStoWingH	100m
WingJtoWingH	450m

Number of Computers installed at various wings are as follows:

Wings	NumberofComputers
WingA	20
WingS	150
WingJ	50
WingH	25

(i)	Suggest the best wired medium and draw the cable layout to efficiently connect various wings of Multipurpose PublicSchool, Bangluru.
Ans	Best wired medium: Optical Fibre OR CAT5 OR CAT6 OR CAT7 OR CAT8 OR Ethernet Cable

			
		(½ Mark for writing best wired medium) (½ Mark for drawing the layout correctly)	
	(ii)	Name the most suitable wing where the Server should be installed. Justify your answer.	
	Ans.	Wing Senior(S)- Because it has maximum number of computers.	
		(½ Mark for correct Wing) (½ Mark for valid justification)	
	(iii)	Suggest a device/software and its placement that would provide data security for the entire network of the School.	
	Ans.	Firewall - Placed with the server at Senior OR Any other valid device/software name	
		(½ Mark for writing device/software name correctly) (½ Mark for writing correct placement)	
	(iv)	Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the campus of Multipurpose Public School, Bangluru.	
	Ans.	Device Name: WiFi Router OR WiMax OR RF Router OR Wireless Modem OR RFTransmitter Protocol : WAP OR 802.16 OR TCP/IP OR VOIP OR MACP OR 802.11	
		(½ Mark for writing correct device name) (½ Mark for writing correct protocol)	