C++ and Data Structure

1- What do you mean by static variable? Explain with help of example.   **(2)**

2- What is Function Overloading? Give an example in C++ to illustrate the same.   **(2)**

3- Differentiate between an identifier and keywords.   **(2)**

4- Differentiate between object oriented programming and procedural programming   **(2)**

5- What do you understand by Copy constructor? Specify two instances when copy constructor is invoked?
                                                                                    (2)

6- Write header file for function given below.   **(2)**
    (a) Getch()   (b) sqrt()   (c) strcpy()   (d) exit()

7- When a function is overloaded, there are multiple definitions of the functions. What makes the various definitions of the function different from each other? Support your answer with suitable example.   2

8- Write the names of header files to which the following belong.   1
i) strcmp( )   ii) sin( )

9- When the object is passed to the function, the copy of the object is made. Does constructor and destructor is called for the object copy? Also explain the meaning of the two.   2

10- Answer the question (i) and (ii) after going through the following class   :   2
class Exam
{
int year;
public:
Exam(int y)   // Constructor 1
{ year=y);}
Exam(Exam &t) // Constructor 2
};
i) Create an object, such that it invokes Constructor 1.
ii) Write complete definition for Constructor 2.

11- Define a class Test in C+ + with following description: 4
Private Members
i) TestCode of type integer
ii) Description of type string
iii) NoCandidate of type integer
iv) CenterReqd (number of centers required) of type integer
v) A member function CALCNTR( ) to calculate and return the number of centers as (NoCandidate/100+1)
Public Members
i) A function SCHEDULE( ) to allow user to enter values for TestCode, Description, NoCandidate & call function CALCNTR( ) to calculate the number of centres.
ii) A function DISPTEST ( ) to allow user to view the content of all the data members.

12- Assume that a text file named TEXT1.TXT already contains some text written into it, write a function named vowelwords( ), that reads the file TEXT1.TXT and create a new file named TEXT2.TXT, which shall contain only those words from the file TEXT1.TXT which don't start with an uppercase vowel(i.e 'A','E','I','O','U').
For example if the file TEXT1.TXT contains   2
Carry Umbrella and Overcoat When it Rains

then the file TEXT2.TXT shall contains

Carry When it Rains

13- Given a binary file APPLY.DAT, containing records of the following class Applicant type   3

```
class Applicant
{
char A_Rno[10];
char A_Name[30];
int A_Score;
public:
void Enrol( )
{
gets(A_Rno);
gets(A_Name);
cin>>A_Score;
}
void Status( )
{
cout<<setw(20)<<A_Rno;
cout<<setw(20)<<A_Name;
cout<<setw(10)<<A_Score<<endl;
}
int ReturnScore( )
{ return A_Score;}
};
```

Write a function in C++, that would read contents of file APPLY.DAT and display Students whose A_Score is below 70.

14- Write the major differences between Object Oriented Programming and Procedural Programming   [2]

15- Name the header file to which the following belong: [1]
    (i) gotoxy()   (ii) srand()

16- List the characteristics of constructor and destructors?   [2]

17- Define a class Shop in C++ with the description given below :   4

private members

name	array of 40 characters	
address	array of 40 characters	
type of item	array of 3X20 characters	
availqty	array of 3 integers	
totalqty	array of 3 integers	

public members

init()   function to ask and store the values of address ,type of items , availqty & totalqty.

purchase()   function to ask the qty purchased and type of item from the user and updates the totalqty and avialqty accordingly .
for example: if the type of items available in the shop are : "Cosmetic" , "Food Products" , "Medicines" . And the shop keeper purchases the "Cosmetic" item then updates the availqty and totalqty of the "Cosmetic" item.

display()   function to display the details of the item in the following format :

```
Name :   <SHOP NAME >
Address :< ADDRESS >
Items :< Type of Item 1>          <Type of Item 2>       <Type Of item 3>
Balance Stock :< avialqty>         <availqty>        <avialqty>
```

18- Answer the questions (i) to (IV) based on the following code: [4]
```
class CUSTOMER
```

```
{
int cust_no;
char cust_name[20];
protected:
void Register( );
public:
CUSTOMER( );
void status( );
};
class SALESMAN
{
int salesman_no;
char salesman_name[20];
protected:
float salary;
public:
SALESMAN( );
void enter( );
void show( );
};
class SHOP: public CUSTOMER, protected SALESMAN
{
char voucher_no[10];
char sales_date[8];
public:
SHOP( );
void sales_entry( );
void sales_detail( );
};
```

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

                            [2]
19- Observe the program segment given below carefully and fill in the blanks marked as statment1 and statement2 using write() and remove() functions for performing the required task.   [1]

```
        #include<fstream.h>
        class Emp
        {
                int Eno;
                char name[20];
                public :
                //function which will delete the data of a specific employee
                void deleteRec(int Eid);
        };
        void Emp::deleteRec(int Eid)
        {
                fstream file;
                file.open("Emp.dat",ios::in|ios::out|ios::binary);
                ofstream ofile("temp.dat");
                while(file)
                {
                        file.read((char *)this,sizeof(eobj));
                        if(this->Eno !=Eid)
                                _____//statement1
                }
                _____//statement 2
```

```
                    rename("temp.dat","emp.dat");
            }
```
20- Write a function to reverse only those lines ends with vowel character from a text file poem.txt.   [2]
21- Write a function in C++ to update the SUPPLIER NAME for a given SNO from a binary file "SUPP.DAT", assuming the binary file is contained the objects of the following class: [3]

```
class SUPPLIER
        {
                int SNO;
                char SUPP_NAME [20];
                public:
                int SUPPNO ( ) { return SNO; }
                void Enter ( ) { cin >> SNO; gets (SUPP_NAME); }
                void Display ( ) { cout << SNO <<SUPP_NAME ; }
        };
```

22- What is the difference between Global Variable and Local Variable? Also, give a suitable C++ code to illustrate both.   2

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

24- Define a class **FLIGHT** in C++ with following description: 4
Private Members:
• A data member Flight number of type integer
• A data member Destination of type string
• A data member Distance of type float
• A data member Fuel of type float
• A member function CALFUEL() to calculate the value of Fuel as per the following criteria :

Distance	Fuel
<=1000	500
more than 1000 and <=2000	1100
more than 2000	2200

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

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

```
class CUSTOMER
{
int Cust_no;
char Cust_Name[20];
protected:
void Register();
public:
CUSTOMER();
void Status();
};
class SALESMAN
{
int Salesman_no;
char Salesman_Name[20];
protected:
float Salary;
```

```
public:
SALESMAN();
void Enter();
void Show();
};
class SHOP : private CUSTOMER , public SALESMAN
{
char Voucher_No[10];
char Sales_Date[8];
public:
SHOP();
void Sales_Entry();
void Sales_Detail();
};
```

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

26- Write a function in C++ to count the number of lines present in a text file
"STORY.TXT".   **2**
27- Given a binary file PHONE.DAT, containing records of the following structure type. 3

```
class Phonlist
  {
        char Name[20] ;
        char Address[30] ;
        char AreaCode[5] ;
        char phoneNo[15] ;
    public :
            void Register();
            void show();
            int CheckCode(char AC[ ])
            {
                 return strcmp(Areacode, AC) ;
             }
     } ;
```

Write a function TRANSFER () in C++, that would copy all those records which are having AreaCode as "DEL" from PHONE.DAT to PHONBACK.DAT.

28- Give one advantage of function overloading with default arguments   1

29- Differentiate between object oriented programming and procedural programming   2

30- What do you understand by Copy constructor? Specify two instances when copy   constructor is invoked?
                                                                          2
31- Differentiate between containership and inheritance with example.   2
32- class Test
   { char paper[12];
     int marks;
   };
   Rewrite the above class definition, by defining a default constructor that assign   1

"*computer*" to paper and marks to *100.*

33- **.** Define a class **BALANCED_MEAL** in C++ with following description:

Private Members:

Access_no	Integer
Food_Name	String of 25 characters
Calories	Integer
Food_type	String
Cost	Float

3

AssignAccess( ) Generates random numbers between 10 and 99 and return it.

Public Members

- A function *INTAKE( )* to allow the user to enter the values of Food_Name, Calories, Food_type, cost and call function *AssignAccess( )* to assign Access_no.
- A function *OUTPUT( )* to allow user to view the content of all the data members, if the Food_type is *Fruit.* Otherwise display message**, "Display only for fruit"**   3

    Write a function that reads binary file **CONSUMER.DAT** containing records of above class, and copy those records to **CONSUMERAREA.DAT ,** whose area is same as given by   user. Also, display the number of such records found.

34- Differentiate between an identifier and keywords.   2

35-Name the header files, to which following inbuilt function belong to: 1

                i. log10( )

               ii. arc( )

36- What is Function Overloading? Give an example in C++ to illustrate the same.   2

37- In Object Oriented Programming, which concept is illustrated by Function1 and Function2 together? Write the statement to call these functions.

38-What is the scope of two data members of the class AirIndia? What does the scope of data members depend upon?

38-Define a class cricket in C++ with the following description: 4

Private members:

- Target_score of type integer
- Overs_bowled of type integer
- Extra_time of type integer
- Penalty of type integer
- Cal_penalty() a member function to calculate penalty as follows:
    If extra_time<=10, penalty=1
    If extra_time>10 but <=20 penalty=2, otherwise, penalty=5

Public members:

- A fuinction Extradata () to allow user to enter values for target_score, over_bowled, Extra_time.
- A function DspData( ) to allow user to view the contents of all data members.   4

39-Write a function in C++ which accepts a 2D array of integers and its size as arguments and display the elements which lie on diagonals.   3

[Assuming the 2D array to be a square matrix with odd dimension, i.e., 3x3, 5x5, etc..]

Example, if the array contents is

5	4	3
6	7	8
1	2	9

Output through the function should be :

Diagonal One : 5 7 9

Diagonal Two: 3 7 1

40- An array Arr[15][20] is stored in the memory along the row with each element occupying 4 bytes. Find out the Base Address and address of the element Arr[3][2], if the element [5][2] is stored at the address 1500.

4

41-Give the necessary declaration of queue containing integer. Write a user defined function in C++ to delete an integer from the queue. The queue is to be implemented as a linked list   3.

42-Write a function in C++ to print the sum of all the values which are either divisible by 2 or are divisible by 3 present in a two-dimensional array passed as the argument to the function.   2

43-Evaluate the following postfix notation of expression: 2

     10   0 + 25 15 - * 30 /

44-Write a function in C++ to count the number of alphabets present in a textfile "Para.Txt".   2

45-Write a function in C++ to add new objects at the bottom of a binary file "Student.Dat", assuming the binary file is containing the object of the following class   3

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

46-What do you mean by static variable? Explain with help of example.   (2)

47-Write the header files to which the following functions belong: (1)

     (i) getc ( ) (ii) isalnum ( ) (iii) scanf ( ) (iv) getxy ( )

48-How member functions and non member functions differ?   (2)

49-Define a class Taxpayer, whose class description is given below:-   (4)

     Private Members:-

        int pan - to store the personal account no.

        char name[20] - to store the name

        float taxableinc - to store the total annual taxable income.

        float tax - to store the tax that is calculated.

        computetax ( )- A function to compute tax from the following rule:-

Total Annual Taxable Income	Rate of Taxation
Up to 60000	0%
Greater than 60000, less than = 150000	5%
Above 150000, upto 500000	10%
Above 500000	15%

     Public Members :-

     inputdata ( ) - A function to enter the data and call the compute tax( ) function.

     display( ) - To display the data.

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

(ii) Write the names of all members which are accessible from objects belonging to class design.

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

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

50-Write a function in C++ which accepts an integer array and its size as arguments / parameters and arrange all the odd numbers in the first row and even numbers in the second row of a two dimensional array as follows. The unused cells of two dimensional array must be filled with 0.

        (3)

      If the array is   1, 2, 3, 4, 5, 6

The resultant 2-D array is given below

```
1    3    5    0    0    0
0    0    0    6    4    2
```

51-A 2-d array defined as A[4..7, -1..3] requires 2 words of storage space for each element stored in row major order. Calculate the address of A[7,0] and base address if the location of A[6,2] as 126.

(3)

52-Consider the following portion of a program, which is implemented as linked list of library. Write the definition of function PUSH( ), to insert a new node in the stack and definitions of function POP(), to delete a node from the stack **(4)**

```
struct Library
{
        int id;
        char name[20];
        Library *Link;
};
```

53- What is the purpose of seekp() and seekg( ) **(1)**

54-Write a function in C++ to read a text file "SPACE.TXT" . Using this file create another file   " OUT.TXT" by replacing more than one space by single space. **(2)**

Example:
If the file "SPACE .TXT" contains the following
I   like   ice cream.

The function should create another file OUT.TXT with the text
 I like ice cream.

55-Write a function in C++ to transfer a particular type of stock from the file "inventory.dat" to another file "backinvent.dat". Assuming that the binary file is containing the records of following structure :   **(3)**

```
 struct Products
{
            int id;
            char Iname[30];
            int type;
};
```
Remember that transfer means deletion from the "inventory.dat" file and addition in the "backinvent.dat" file.

DBMS

a) What is primary key and candidate key?   **2**
b) Write SQL command for (a) to (d) and write the outputs for (e) on the basis of table   **6**

Table : CLUB

COACH-ID	COACHNAME	AGE	SPORTS	DATOFAPP	PAY	SEX
1	KUKREJA	35	KARATE	27/03/1996	1000	M
2	RAVINA	34	KARATE	20/01/1998	1200	F
3	KARAN	34	SQUASH	19/02/1998	2000	M
4	TARUN	33	BASKETBALL	01/01/1998	1500	M
5	ZUBIN	36	SWIMMING	12/01/1998	750	M
6	KETAKI	36	SWIMMING	24/2/1998	800	F
7	AMKITA	39	SQUASH	20/02/1998	2200	F
8	ZAREEN	37	KARATE	22/02/1998	1100	F
9	KUSH	41	SWIMMING	13/01/1998	900	M
10	SHAILYA	37	BASKETBALL	19/02/1998	3700	M

a) To show all information about the swimming coaches in the club.
b) To list names of all coaches with their data of appointment (DATOFAPP) in descending order.
c) To display a report, showing coach name, pay, age and bonus (15% of pay) for all coaches.
d) To insert a new record in the CLUB table with the following data:
  11,"Rajender",25,"Football",{27/05/2004},4500,"M"
e) give the output of the following SQL statements:
  i) Select count(distinct SPORTS) from CLUB;
  ii) Select min(AGE) from CLUB where SEX='F';
  iii) Select AVG(PAY) from CLUB where SPORTS='KARATE';
  iv) Select SUM(PAY) from CLUB where DATOFAPP>{31/01/98};

5. (a) What do you understand by Degree and Cardinality of a table? **2**
  (b) Consider the following table **INTERIORS** and **NEWONES** and give the answer (B1) and (B2) parts of this question.

Table: INTERIORS

No	ITEMNAME	TYPE	DATEOFSTOCK	PRICE	DISCOUNT
1.	Red rose	Double Bed	23/02/02	32000	15
2.	Soft touch	Baby cot	20/01/02	9000	10
3.	Jerry's home	Baby cot	19/02/02	8500	10
4.	Rough wood	Office Table	01/01/02	20000	20
5.	Comfort zone	Double Bed	12/01/02	15000	20
6.	Jerry look	Baby cot	24/02/02	7000	19
7.	Lion king	Office Table	20/02/02	16000	20
8.	Royal tiger	Sofa	22/02/02	30000	25
9.	Park sitting	Sofa	13/12/01	9000	15
10.	Dine paradise	Dining Table	19/02/02	11000	15

Table: NEWONES

No	ITEMNAME	TYPE	DATEOFSTOCK	PRICE	DISCOUNT
11.	White wood	Double Bed	23/03/03	20000	20
12.	James 007	Sofa	20/02/03	15000	15
13.	Tom Look	Baby Cot	21/02/03	7000	10

(B1) Write SQL commands for the following statements: **4**
   (i) To show all information about the Sofa from the **INTERIORS** table.
   (ii) To list the ITEMNAME which are priced at more than 10000 from the **INTERIORS** table?
   (iii) To list ITEMNAME and type of those items, in which **DATEOFSTOCK** is before 22/01/02 from
        INTERIORS table in descending order of ITEMNAME.
   (iv) To display ITEMNAME and **DATEOFSTOCK** of those items, in which the DISCOUNT percentage is
        more than 15 from **INTERIORS** table.
   (v) To count the number of items, whose TYPE is "Double Bed" from **INTERIORS** table?
   (vi) To insert a new row in the **NEWONES** table with the following data:
        14,"True Indian", "Office Table", {28/03/03}, 15000, 20

(B2) Give the output of the following SQL queries **2**
   (Note: without considering the insertion)
   (i) Select count (Distinct TYPE) from **INTERIORS**;
   (ii) Select AVG (DISCOUNT) from **INTERIORS** where TYPE="Baby cot";
   (iii) Select SUM (Price) from **INTERIORS** where DATEOFSTOCK<{12/02/02};
   (iv) Select MAX(DISCOUNT) from **INTERIORS**;

V

a) Define

    i) Cardinality   ii) Candidate Key   **2**

b) Consider the following tables **GAMES-** storing the details of games and **PLAYER** –storing the details of players who have enrolled their names for the scheduled games. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (vi)

Table: GAMES

GCode	GameName	No_Players	PrizeMoney	ScheduleDate
101	Carom Board	2	5000	23-Jan-2011
102	Badminton	2	12000	12-Apr-2011
103	Table Tennis	4	8000	14-Feb-2011
105	Chess	2	9000	11-Jan-2011
108	Lawn Tennis	4	25000	19-May-2011

Table: PLAYER

PCode	PlayerName	GCode
11	Nabi Ahmad	101
12	Ravi Sahai	108
13	Jatin	101
14	Nazneen	103

   i)   To display name of those games whose PrizeMoney is in the range 10000 to 30000 and No_Players above 2.

   ii)   To display the details of games whose GameName starts with 'C' in ascending order of ScheduleDate.

   iii)   To display count of players enrolled for each game.

   iv)   Display each PCode, PlayerName and the GameName for which they have enrolled.

   v)   SELECT SUM(PrizeMoney) FROM GAMES;

   vi)   SELECT COUNT(DISTINCT GCode) FROM PLAYER;   **6**

Ques5.

   a)   What do you mean by Candidate Key and Foreign Key?   **2**

   b)   Consider the following tables STORE and SUPPLIERS a. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii).   **6**

Table: STORES

ItemNo	Item	Scode	Qty	Rate	LastBuy
2005	Sharpner Classic	23	60	8	31-Jun-09
2003	Ball Pen 0.25	22	50	25	01-Feb-10
2002	Gel Pen Premium	21	150	12	24-Feb-10
2006	Gel Pen Classic	21	250	20	11-Mar-09
2001	Eraser Small	22	220	6	19-Jan-09
2004	Eraser Big	22	110	8	02-Dec-09
2009	Ball Pen 0.5	21	180	18	03-Nov-09

Table: SUPPLIERS

Scode	Sname
21	Premium Stationary
23	Soft Plastics
22	Tetra Supply

i) To display details of all the items in the Store table in ascending order of LastBuy.
ii) To display Itemno and item name of those items from store table whose rate is more than 15 rupees.
iii) To display the details of those items whose supplier code is 22 or Quantity in store is more than 110 from the table Store.
iv) To display minimum rate of items for each Supplier individually as per Scode from the table Store.
v) SELECT COUNT(DISTINCT Scode) FROM STORE;
vi) SELECT Rate*Qty FROM STORE WHERE Itemno=2004;
vii) SELECT Item,Sname FROM STORE S, SUPPLIER P WHERE S.Scode=P.Scode AND ItemNo=2006.
viii) SELECT MAX(LastBuy)FROM STORE;

Q5.
(a) Explain Cartesian Product of two relations? (2)
(b) Consider the following tables Client and Bill. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii) (6)

Table : Client

Cust_Id	Cust_Name	Address	Phone_no	City
C007	Pritam Sharma	12,M.G Road	71274250	Bangalore
C008	Sutopa	14/1 Pritam Pura	41206819	Delhi
C010	Anurag Basu	15A, Park Road	61281921	Kolkata
C012	Hrithik	7/2 Vasant Kunj	26121949	Delhi
C013	Firoz Shah	2, Servamali road	25014192	Bangalore
C025	Vinod Nagpal	46-a Navi Mumbai	64104944	Mumbai
C027	Sameer	41,Dwarka	42101619	Delhi
C002	Pasunjit Bose	16/A K.G Marg	27220012	Bangalore
C035	Aamina Begum	13/A Versova	41612181	Mumbai

Table : BILL

Ord_id	Cust_id	Item	Ord_date	Qty	Price
7002	C007	Pizza	20-11-07	1	249.50
7003	C013	Garlic Bread	24-10-05	3	75.75
7004	C012	Pasta	03-03-07	4	173.00
7005	C010	Ice Cream	01-01-08	30	195.75
7006	C035	Pizza	02-03-06	4	249.50
7009	C035	Garlic Bread	02-03-08	2	75.75
7010	C013	Brownie	04-05-07	4	40.50
7011	C014	Ice Cream	02-06-08	5	195.75
7012	C002	Pizza	01-02-08	7	249.50

(i) Display a report containing cust_id, cust_name, Item,qty,price and bill amount. Bill amount is calculated as the sum of qty*price
(ii) Display how many customers have ordered Pizza in the month of March.
(i) Count the number of customer who have ordered item worth more than 1700. Total amount = sum of qty* price
(ii) Display the name of customer along with their city in alphabetical order of city
(iii) select Cust_name , City, ord_date from Client A, Bill b Where A.Cust_id =b.Cust_id;
(iv) select Cust_name from Client where Cust_id=(Select Cust_id from Bill where Year(ord_date) =2008)
(v) select count(*) from Client group by City;
(vi) select Distinct (Item) from Bill;

5. a) Explain Candidate key and Relation? [2]
b) Consider the following tables BOOKS and ISSUED. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii) [6]

Book_Id	Book_Name	Author_Name	Publishers	Price	Type	Quantity
C01	Fast Cook	Lata Kapoor	EPB	355	Cookery	5
F01	The Tears	William Hopkins	First	650	Fiction	20
T01	My C++	Brain & Brooke	FPB	350	Text	10
T02	C++ Brain	A.W.Rossaine	TDH	350	Text	15
F02	Thuderbolts	Anna Roberts	First	750	Fiction	50

BOOKS

ISSUED

Book_Id	Quantity_Issued
T01	4
C01	5
F01	2
C01	6
T02	3

    i)   To list the names from books of Text type.
ii) To display the names and price from books in ascending order of their price.
iii) To increase the price of all books of EPB publishers by 50.
vi) To display the Book Name, Quantity_Issued and Price for all books of EPB publishers.
v) Select max (price) from books;
vi) Select count (DISTINCT Publishers) from books where Price >=400;
vii) Select Book_Name, Author_Name from books where Publishers = 'First';
viii) Select min(Price) from books where type = 'Text';

BOOLEAN ALGEBRA

VI

a) Show algebraically:- $(A.(B'C))' + B'C + AC = 1$ 2

b) Write the equivalent Boolean expression for the logic circuit given below
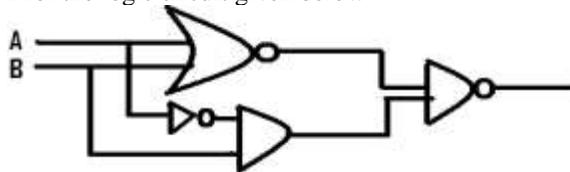
    1

c) Write the canonical P-O-S expression for the following S-O-P expression
    $F(a,b,c) = \sum(1,2,5,6)$ 2
    d) Reduce the following expression using K-map and draw the circuit only using NOR gate $F(a,b,c,d) =$
    $\pi(0,1,2,4,5,6,8,9,10,14)$

Q6.

    (a) State and algebraically verify Absorption Laws.   (2)

    (b) Write the POS form of a Boolean Function F, which is represented by the following truth table:
        (1)

A	B	C	F
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

(c) Obtain the simplified form of the Boolean Expression using K' Map: (3)
$$F(x , y , z, w) = \sum (0,2,4,5,8,9,12,13,15)$$
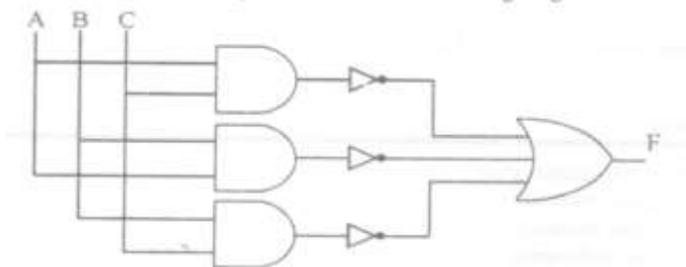(c) Represent OR operation using NAND gates only. (1)
(d) Write the equivalent Canonical Product of Sum for the following expression. (1)
$$F(A,B,C) = \sum(1,2,3,4)$$

Ques6
   a) State and verify Associative Law. 2
   b) Write the equivalent expression for the following Logic Circuit: 1

   c) Convert the following Boolean expression into its equivalent Canonical Product of Sum Form(POS)
1
      A.B'.C+A'.B.C+A'.B.C'
   d) Reduce the following Boolean Expression using K-Map: 4
      $F(P,Q,R,S)=\sum(0,3,5,6,7,11,12,15)$

Q 6.a) State and verify *Distributive law.* [2]
 b) Convert the following Boolean expression into its equivalent Canonical product *of*
    sum form *(POS)*: F (a, b, c) = $\sum$ (1, 3, 5, 6) [2]
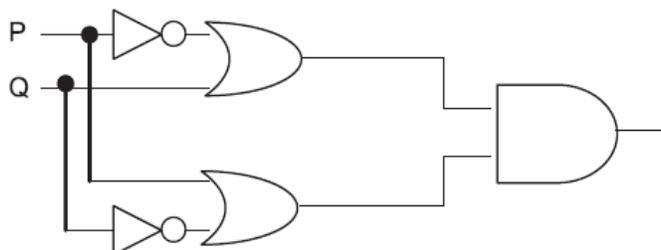 c) Write the equivalent Logic Circuit for the following Boolean Expression
    AB(C'D + B'C) + BC [1]
 d) Reduce the following Boolean Expression using K-Map [3]
    F(A,B,C,D) = $\sum$ (1,3,4,5,6,7,9,11,12,13,14,15)

6. (a) State and verify De Morgan's Laws algebraically. 2
   (b) Write the equivalent Boolean Expression for the following Logic Circuit. 2

(c) Reduce the following Boolean Expression using K-Map: 3

F(A,B,C,D)= (0,1,2,4,5,6,8,10)

(d) 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

Ques 6.
   a)   State and verify Demorgan's Laws algebraically.   2
   b)   Convert the following Boolean expression into its equivalent Canonical Sum of Product Form (SOP).   1
        (X'+Y+Z').(X'+Y+Z).(X'+Y'+Z).(X'+Y'+Z')
   c)   Write the equivalent expression for the following Logical Circuit: 2
   d)

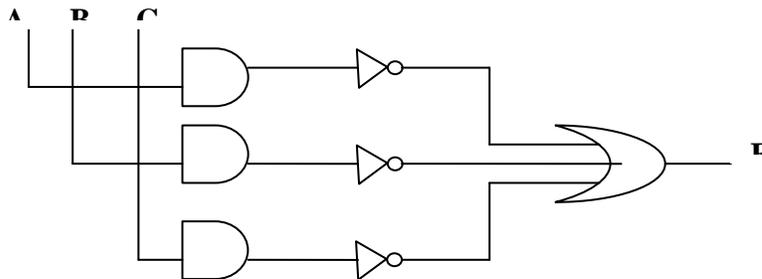   e)   Reduce the following Boolean expression using K-Map: 3
           F(P,Q,R,S)=∏ (0,3,5,6,7,11,12,15)

DCN

Q7.   (a) Compare any two Switching techniques.   (1)
      (b) What do you mean by a router and switch?   (1)
      (c) What is web Portal ? Name any one.   (1)
      (d) How is Freeware different from Free Software?   (1)

      (e) Expand the following :   (2)

           a) FLOSS   b) HTML   c) GNUd) ARPANET

      (f) Akruti Software Inc has set up its new Branch at Bangalore for its office and web based activities. It has four wings of buildings namely A , K, R , S.   (4)

           The distance between the wings are as follows :
                    Wing A to K   40 M
                    Wing K to R   120 M
                    Wing R to S   60 M
                    Wing A to S   170 M
                    Wing K to S   150 M
                    Wing A to R   70 M
           The number of computers in each wing is shown below:

Wing A25
Wing K50
Wing R 125
Wing S 10

i)   Suggest a most suitable topology along with layout for connecting all the four wings.
ii) Suggest the most suitable place to house the server with suitable reason.
iii)   Suggest the placement of the following device with justification.
   a) Repeater   b) Modem
iv)   The organization is planning to link its head office situated in Delhi with the offices at Bangalore. Suggest an economic way to connect it; the company is ready to compromise on the speed of the connectivity. Justify your answer.

Ques. 7.
a) Name the two transmission media for networking. Also write one advantage for each.   2
b) Expand the following terms: 1
   i) XML ii) GSM
c) Differentiate between Hackers and Crackers?   1
d) Indian Public School in Darjeeling is setting up the network between the different wings. There are 4 wings names as Senior(S), Junior(J), Admin(A) and Hostel(H).   4
   Distance between various wings

Wing A to Wing S	100m
Wing A to Wing J	200m
Wing A to Wing H	400m
Wing S to Wing J	300m
Wing S to Wing H	100m
Wing J to Wing H	450m

Wing A	10
Wing S	200
Wing J	100
Wing H	50

i)   Suggest a suitable Topology for Networking the computer of all wings
ii)   Name the wing where the server is to be installed. Justify your answer.
iii)   Suggest the placement of Hub/Switch in the network.
iv)   Mention an economic technology to provide internet accessibility to all wings.
e) What do you mean by Cyber law?   1
   f) What do you mean by free software?

VII
a) Differentiate between message switching and packet switching.   2
b) Expand the following:
   (i) SMS   (ii) CDMA   (iii) TCP / IP   iv)GSM   2
c) Define
   i) Firewall   ii) Proprietory software   2
d) "**China Middleton Fashion**" is planning to expand their network in India, starting with two cities in India to provide infrastructure for distribution of their product. The company has planned to set up their main office units in Chennai at three locations and have named their offices as "Production Unit", "Finance Unit" and "Media Unit". The company has its corporate unit in New Delhi.

INDIA

Corporate Unit
(New Delhi)

CHENNAI

Production
Unit

Media
Unit

Finance
Unit

Approximate distances between these Units is as follows:

From	To	Distance
Production Unit	Finance Unit	70 mtrs
Production Unit	Media Unit	15 KM
Production Unit	Corporate Unit	2112 KM
Finance Unit	Media Unit	15 KM

4

In continuation of the above, the company experts have planned to install the
following number of computers in each of their office units:

Production Unit	150
Finance Unit	35
Media Unit	10
Corporate Unit	30

i) Suggest the kind of network required (LAN,MAN,WAN) for connecting each of the
   following office units:
   1)• Production Unit and Media Unit
   2)• Production Unit and Finance Unit
ii) Which one of the following devices will you suggest for connecting all the computers
    within each of their office units?
         • Switch/Hub   • Modem   • Telephone
iii) Which of the following communication media, will you suggest to be procured by the
     company for connecting their local offices in Chennai for very effective (High Speed)   communication?
         • Ethernet cable   • Optical fiber   • Telephone cable
(iv) Suggest a cable/wiring layout for connecting the company's local office units located
     in Chennai. Also, suggest an effective method/technology for connecting Chennai unit to the company's office
     unit located in Delhi.

7. **a) Define the term Bandwidth. Give any one unit of Bandwidth.**   1
   b) Which of the following is not a Client Side script: 1
   (i) VB Script   (ii) Java Script
   (iii) ASP   (iv) PHP
   (c) What is a topology? Write short note on Bus topology.   2
   (d) Expand the following terms with respect to Networking: 2
      (i) PPP (ii) GSM   (iii) HTTP (iv) XML
   (e) Knowledge Supplement Organization 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:

Block
A

Block
C

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

1) Suggest a cable layout of connections between the blocks.   1
2) Suggest the most suitable place (i.e. block) to house the server of this organization with a   suitable reason.
1
3) Suggest the placement of the following devices with justification   1
   (i) Repeater
   (ii) Hub/Switch
       4) 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?

7. (a) Write one advantage and disadvantage of Bus Topology.   [1]
(b) Expand the following terms with respect to Networking.   [1]
 i). WLL   ii) PHP
(c) Differentiate between Freeware and shareware?   [1]
(d) What are Cookies?   [1]
(e) Differentiate between Hackers and Crackers?   [1]
(f) What is FTP?   [1]
d)) "Kanganalay Cosmetics" is planning to start their offices in four major cities in Uttar Pradesh to provide cosmetic product support in its retail fields. The company has planned to set up their offices in Lucknow at three different locations and have named them as "Head office", "Sales office", & "Prod office". The company's regional offices are located at Varanasi, Kanpur & Saharanpur. A rough layout of the same is as follows:
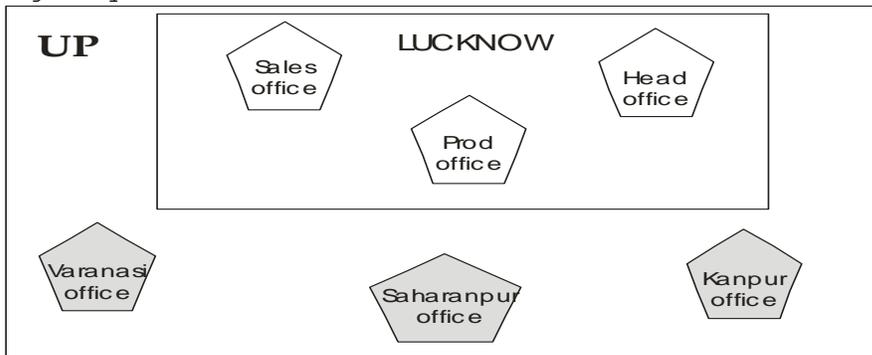
An approximate distance between these offices as per network survey team is as follows:

Place from	Place to	Distance

Head office	Sales office	15 KM
Head office	Prod office	8 KM
Head office	Varanasi Office	295 KM
Head office	Kanpur Office	195 KM
Head office	Saharanpur office	408 KM

Number of computers:

Head office	156
Sales office	25
Prod office	56
Varanasi Office	85
Kanpur Office	107
Saharanpur office	105

i)   Suggest the placement of the *repeater* with justification.   [1]

ii)   Name the branch where the *server* should be installed. Justify your answer. [1]

iii) Suggest the *device* to be procured by the company for connecting all the computers within each of its offices out of the following devices [1]

- Modem
- Telephone
- Switch/Hub

iv) The company is planning to link its head office situated in Lucknow with the office at Saharanpur. Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer. [1]

Ques 7

a)   Write two application of Cyber Law.   1

b)   Write the following abbreviations in their full form: 1
     FTP, WWW

c)   Name the device used to connect a computer to an analog telephone line.   1

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

e)   ABC SWITCHGEARS LTD. In Srinagar is setting up the network between its different departments located in different wings. There are 4 wings named as Manufacturing(M), Research(R), Administration (A) and Personnel (P).

4

Distance between various wings are given below:

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Wing A to Wing M	100m
Wing A to Wing R	200m
Wing A to Wing P	400m
Wing M to Wing R	300m
Wing M to Wing P	100m
Wing R to Wing P	450m

Number of computers

Wing M	15
Wing R	100
Wing A	50
Wing P	150

i) Suggest a suitable topology for networking the computers of all wings.

ii) Name the wing where the server is to be installed. Justify your answer.

iii) Suggest the placement of Hub/Switch in the network.

iv) Mention the economic technology to provide accessibility to all wings.

f) What do you mean by Firewall?