COMPUTER SCIENCE

Time allowed : 3 hours   *Maximum Marks : 70*

Instructions :

(i)   **All** *questions are compulsory.*

(ii)   *Programming Language : C++*

QUESTION PAPER CODE 91/1

1.   (a)   Differentiate between a Call by Value and Call by Reference, giving suitable
             examples of each.   2

(b)   Name the header files to which the following belong: 1
      (i)   abs( )
      (ii)   strcmp( )

(c)   Rewrite the following program after removing the syntactical error(s), if any.
      Underline each correction.   2

```
#include <iostream.h>
const int Multiple 3;
void main ()
{
   Value=15;
   for (int Counter = 1;Counter=<5;Counter++,Value-=2)
     if (Value%Multiple==0)
       cout<<Value * Multiple;
       cout<<endl;
     else
       cout<<Value+Multiple<<endl;
}
```

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

```
#include<iostream.h>
struct MyBox
{
    int Length, Breadth, Height;
};
void Dimension (MyBox M)
{
```

```
        cout<<M.Length<<"x"<<M.Breadth<<"x";
        cout<<M.Height<<endl;
    }
    void main()
    {
        MyBox B1={10,15,5}, B2, B3;
        ++B1.Height;
        Dimension(B1);
        B3 = B1;
        ++B3.Length;
        B3.Breadth++;
        Dimension(B3);
        B2 = B3;
        B2.Height+=5;
        B2.Length--;
        Dimension(B2);
    }
```

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

```
#include<iostream.h>
#include<string.h>
#include<ctype.h>
    void Convert(char Str[],int Len)
{
    for (int Count =0; Count<Len; Count++ )
    {
      if (isupper (Str [Count] ) )
         Str[Count]=  tolower(Str[Count]);
       else if (islower (Str [Count] ) )
         Str[Count]=  toupper(Str[Count]);
       else if (isdigit (Str [Count]))
         Str[Count]= Str[Count] + 1;
       else Str[Count] = '*';
    }
}
```

```
void main ()
{
    char Text [] = "CBSE Exam 2005";
    int  Size=strlen(Text);
    Convert(Text,Size);
    cout<<Text<<endl;
    for (int C = 0,R=Size-1;C<=Size/2; C++,R--)
    {
        char Temp = Text[C];
        Text [C] = Text [R] ;
        Text [R] = Temp;
    }
    cout<<Text<<endl;
}
```

(f) Observe the following program SCORE.CPP carefully, if the value of Num entered by the user is 5, choose the correct possible output(s) from the options from (i) to (iv), and justify your option.   2

```
//program : SCORE.CPP
#include<stdlib.h>
#include<iostream.h>
void main()
{
    randomize();
    int Num, Rndnum;
    cin>>Num;
    Rndnum = random(Num) + 5;
    for (int N = 1; N<=Rndnum; N++)
        cout<<N<<" ";
}
```

Output Options:

(i)   1 2 3 4

(ii) 1 2

(iii) 1 2 3 4 5 6 7 8 9

(iv) 1 2 3

2. **(a)** Define the term Data Hiding in the context of Object Oriented Programming. Give a suitable example using a C++ code to illustrate the same.   2

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

```
class Test
{
    char Paper[20];
    int Marks;
public:
    Test()                          // Function 1
    {
        strcpy(Paper,  "Computer")
        Marks = 0;
    }
    Test(char P[] )                 // Function 2
    {
        strcpy(Paper,P);
        Marks = 0;
    }
    Test(int M)                     // Function 3
    {
        strcpy(Paper,"Computer");
        Marks = M;
    }
    Test(char P[], int M)       // Function 4
    {
        strcpy(Paper,  P);
        Marks = M;
    }
};
```

(i)   Which feature of Object Oriented Programming is demonstrated using Function 1, Function 2, Function 3 and Function 4 in the above class Test?

(ii) Write statements in C++ that would execute Function 2 and Function 4 of class Test.

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

Private Members:

PlanCode	of type long
Place	of type character array (string)
Number_of_travellers	of type integer
Number_of_buses	of type integer

Public Members:

A constructor to assign initial values of Plan Code as 1001, Place as "Agra", Number_of_travellers as 5, Number_of_buses as 1

A function NewPlan( ) which allows user to enter PlanCode, Place and Number_of_travellers. Also, assign the value of Number_of_buses as per the following conditions :

Number_of_travellers	Number_of_buses
Less than 20	1
Equal to or more than 20 and less than 40	2
Equal to 40 or more than 40	3

A function ShowPlan( ) to display the content of all the data members on screen.

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

```
class  Medicines
{
    char  Category[lO];
    char  Date_of_manufacture[lO];
    char  Company[20];
public:
    Medicines();
    void  entermedicinedetails();
    void  showmedicinedetails();
} ;
class Capsules: public  Medicines
{
protected:
    char  capsule_name[30];
    char  Volume_label[20];
public:
    float  Price;
    Capsules();
    void  entercapsuledetails();
    void  showcapsuledetails();
};
class  Antibiotics: public  Capsule
{
    int  Dosage_units;
    char  Side_effects[20];
    int  Use_within_days;
public:
    Antibiotics()  ;
    void  enterdetails();
    void  showdetails();
};
```

(i) How many bytes will be required by an object of class Medicines and an object of class Antibiotics respectively?

(ii) Write names of all the member functions accessible from the object of class Antibiotics.

(iii) Write names of all the members accessible from member functions of class Capsules.

(iv) Write names of all the data members, which are accessible from objects of class Antibiotics.

3. (a) Write a function in C++ which accepts an integer array and its size as arguments/parameters and exchanges the values of first half side elements with the second half side elements of the array. 3

Example:

If an array of eight elements has initial content as

2,4,1,6,7,9,23,10

The function should rearrange the array as

7,9,23,10,2,4,1,6

(b) An array Arr[15][35] is stored in the memory along the column with each of its elements occupying 8 bytes. Find out the base address and the address of an element Arr[2][5], if the location Arr[5][10] is stored at the address 4000. 4

(c) Write a function in C++ to perform a PUSH operation in a dynamically allocated stack considering the following: 4

```
struct Node
{
    int X, Y;
    Node *Link;
};
class STACK
{
    Node *Top;
public:
    STACK()  {Top=NULL;}
    void PUSH();
    void POP() ;
    ~STACK();
};
```

(d) 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. 3

(e) Evaluate the following postfix notation of expression: 2

```
10 20 + 25 15 - * 30 /
```

4. (a) Observe the program segment given below carefully, and answer the question that follows: 1

```
class Book
{
   int Book no;
   char Book_name[20];
public:
   //function to enter Book details
   void enterdetails();
   // function to display Book details
   void showdetails();
   //function to return Book_no
   int Rbook_no(){return Book_no;}
} ;
void Modify(Book NEW)
{
   fstream File;
   File.open("BOOK.DAT",ios::binary|ios::in|ios::out);
   Book OB;
   int Recordsread = 0, Found = 0;
   while (!Found && File.read((char*)&OB, sizeof(OB)))
   {
      Recordsread ++ ;
      if (NEW.RBook_no() == OB.RBook_no))
      {
         _____ //Missing Statement
         File.write((char*)&NEW, sizeof (NEW));
         Found = 1;
      }
      else
         File.write((char*)&OB, sizeof(OB));
   }
   if (!Found)
      cout<<" Record for modification does not exist";
   File.close();
}
```

If the function Modify( ) is supposed to modify a record in file BOOK.DAT with the values of Book NEW passed to its argument, write the appropriate statement for **Missing Statement** using seekp( ) or seekg( ), whichever needed, in the above code that would write the modified record at its proper place.

(b) Write a function in C++ to count and display the number of lines starting with alphabet 'A' present in a text file "LINES.TXT". 2

Example:
If the file "LINES.TXT" contains the following lines,

A boy is playing there.
There is a playground.
An aeroplane is in the sky.
Alphabets and numbers are allowed in the password.

The function should display the output as 3

(c) Given a binary file STUDENT.DAT, containing records of the following class Student type 3

```
class Student
{
    char S_Admno[lO];    //Admission number of student
    char S_Name[30];     //Name of student
    int Percentage;      //Marks Percentage of student
public:
    void EnterData()
    {
        gets(S_Admno);gets(S_Name);cin>>Percentage;
    }
    void DisplayData()
    {
        cout<<setw(12)<<S_Admno;
        cout<<setw(32)<<S_Name;
        cout<<setw(3)<<Percentage<<endl;
    }
    int ReturnPercentage(){return Percentage;}
};
```

Write a function in C++, that would read contents of file STUDENT.DAT and display the details of those Students whose Percentage is above 75.

5. (a) What do you understand by the terms **Primary Key** and **Degree of a relation** in relational database? 2

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

EMPLOYEES

EMPID	FIRSTNAME	LASTNAME	ADDRESS	CITY
010	George	Smith	83 First Street	Howard
105	Mary	Jones	842 Vine Ave.	Losantiville
152	Sam	Tones	33 Elm St.	Paris
215	Sarah	Ackerman	440 U.S. 110	Upton
244	Manila	Sengupta	24 Friends Street	New Delhi
300	Robert	Samuel	9 Fifth Cross	Washington
335	Henry	Williams	12 Moore Street	Boston
400	Rachel	Lee	121 Harrison St.	New York
441	Peter	Thompson	11 Red Road	Paris

EMPSALARY

EMPID	SALARY	BENEFITS	DESIGNATION
010	75000	15000	Manager
105	65000	15000	Manager
152	80000	25000	Director
215	75000	12500	Manager
244	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman
441	28000	7500	Salesman

(i)   To display Firstname, Lastname, Address and City of all employees living in Paris from the table EMPLOYEES.

(ii) To display the content of EMPLOYEES table in descending order of FIRSTNAME.

(iii) To display the Firstname, Lastname, and Total Salary of all Managers from the tables EMPLOYEES and EMPSALARY, where Total Salary is calculated as Salary + Benefits.

(iv) To display the Maximum salary among Managers and Clerks from the table EMPSALARY.

(v) SELECT FIRSTNAME, SALARY
   FROM EMPLOYEES, EMPSALARY
   WHERE DESIGNATION = 'Salesman' AND
   EMPLOYEES.EMPID=EMPSALARY.EMPID;

(vi) SELECT COUNT(DISTINCT DESIGNATION)FROM EMPSALARY;

(vii) SELECT DESIGNATION, SUM(SALARY)
   FROM EMPSALARY
   GROUP BY DESIGNATION HAVING COUNT(*)>2;

(viii) SELECT SUM(BENEFITS)
   FROM EMPLOYEES
   WHERE DESIGNATION = 'Clerk';

6. (a) State and verify Associative law in Boolean Algebra. 2

(b) Write the equivalent Boolean expression for the following Logic Circuit : 2
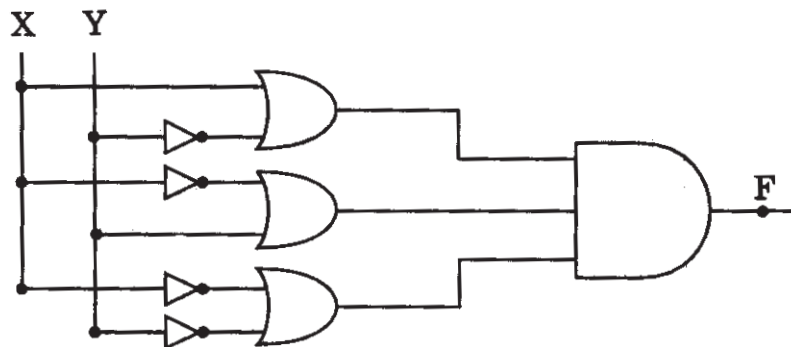
(c) Write the SOP form of a Boolean Function F, which is represented by the following truth table: 1

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

(d) Reduce the following Boolean expression using K - Map: 3
   $F (A, B, C, D) = \prod (O, 1, 2, 3, 4, 5, 10, 11, 15)$

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7. (a) What is the difference between Message Switching technique and Packet Switching technique? 1

(b) Expand the following terminologies : 2
   (i) TCP/IP
   (ii) XML
   (iii) CDMA
   (iv) WLL

(c) Write two application of Cyber Law. 1

(d) The Great Brain Organisation has set up its new Branch at Srinagar for its office and web based activities. It has 4 Wings of buildings as shown in the diagram :
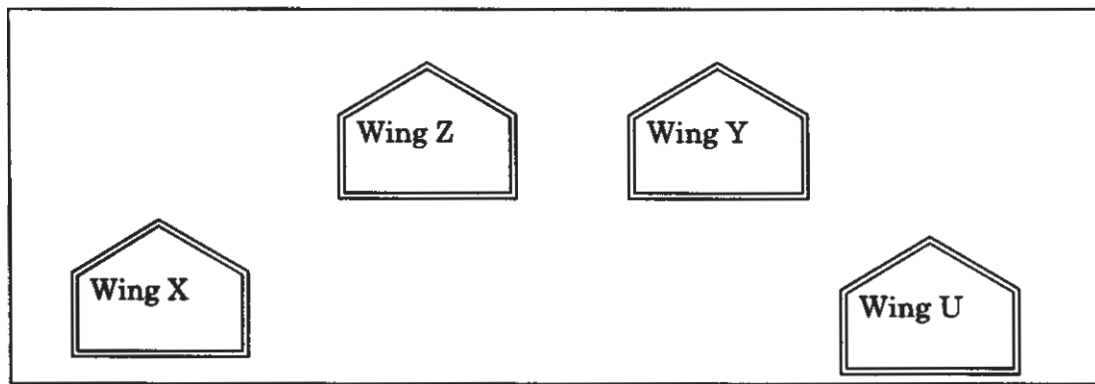
Center to center distances between various blocks

Wing X to Wing Z	50m
Wing Z to Wing Y	70m
Wing Y to Wing X	125m
Wing Y to Wing U	80m
Wing X to Wing U	175m
Wing Z to Wing U	90m

Number of Computers

Wing X	50
Wing Z	30
Wing Y	150
Wing U	15

(i) Suggest a most suitable cable layout of connections between the Wings, and topology. 1

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(ii) Suggest the most suitable place (i.e. Wing) to house the server of this organisation with a suitable reason, with justification.   1

(iii) Suggest the placement of the following devices with justification: 1
    (1) Repeater
    (2) Hub/Switch

(iv) The organization is planning to link its head office situated in Delhi with the offices at Srinagar. Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer.   1

QUESTION PAPER CODE 91

1. (a) Differentiate between a default constructor and copy constructor, giving suitable examples of each.   2

(b) Name the header files to which the following belong :   1
    (i) puts ( )
    (ii) isalnum ( )

(c) Rewrite the following program after removing the syntactical error(s), if any. Underline each correction.   2

```
#include  <iostream.h>
const int Dividor 5;
void main()
{
   Number=15;
   for (int Count = 1;Count=<5;Count++,Number-=3)
      if (Number%Dividor==0)
         cout<<Number / Dividor;
         cout<<endl;
      else
         cout<<Number + Dividor<<endl;
}
```

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

```cpp
#include<iostream.h>
struct Package
{
     int Length, Breadth, Height;
};
void Occupies(Package M)
{
     cout<<M.Length<<"x"<<M.Breadth<<"x";
     cout<<M.Height<<endl;
}
void main()
{
     Package Pl={100,150,50}, P2, P3;
     ++P1.Length;
     Occupies(P1);
     P3 = P1;
     ++P3.Breadth;
     P3.Breadth++;
     Occupies(P3);
     P2 = P3;
     P2.Breadth+=50;
     P2. Height--;
     Occupies(P2);
}
```

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

```cpp
#include<iostream.h>
#include<string.h>
#include<ctype.h>
void Change(char Msg[],int Len)
{
   for (int Count =0; Count<Len; Count++ )
   {
      if (islower(Msg[Count]))
         Msg[Count]= toupper{Msg[Count]);
      else if (isupper(Msg[Count]))
         Msg[Count]= tolower(Msg[Count]);
      else if (isdigit(Msg[Count]))
         Msg[Count]= Msg[Count] + 1;
      else Msg[Count] = '*' ;
   }
```

```
    }
void main()
{
    char Message[] = "2005 Tests ahead";
    int Size = strlen(Message);
    Change(Message,Size);
    cout<<Message<<endl;
    for (int C = 0,R=Size-1;C<=Size/2; C++,R--)
    {
        char Temp = Message[C];
        Message[C]= Message[R];
        Message[R]= Temp;
    }
    cout<<Message<<endl;
}
```

(f) Observe the following program GAME.CPP carefully, if the value of Num entered by the user is 14, choose the correct possible output(s) from the options from (i) to (iv), and justify your option.   2

```
//Program : GAME.CPP
#include<stdlib.h>
#include<iostream.h>
void main()
{
    randomize();
    int Num, Rndnum;
    cin>>Num;
    Rndnum = random(Num) + 7;
    for (int N = 1; N<=Rndnum ; N++)
        cout<<N<<" ";
}
```

Output Options :

(i)   **1 2 3**

(ii) **1 2 3 4 5 6 7 8 9 10 11**

(iii) **1 2 3 4 5**

(iv) **1 2 3 4**

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2. (a) Define the term Data Encapsulation in the context of Object Oriented Programming. Give a suitable example using a C++ code to illustrate the same.   2

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

```
class  Exam
{
        int  Marks;
        char  Subject[20];
public:
    Exam()                                  //Function  1
    {
        Marks = 0;
        strcpy  (Subject,"Computer");
    }
    Exam(char  S[])                         //Function  2
    {
        Marks = 0;
        strcpy(Subject,S);
    }
    Exam(int  M)                            //Function  3
    {
        Marks = M;
        strcpy(Subject,"Computer");
    }
    Exam(char  S[],  int  M)                //Function  4
    {
        Marks   =   M;
        strcpy(Subject,S);
    }
};
```

(i) Write statements in C++ that would execute Function 3 and Function 4 of class Exam.

(ii) Which feature of Object Oriented Programming is demonstrated using Function 1, Function 2, Function 3 and Function 4 in the above class Exam ?

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

Private Members :

TravelCode	of type long
Place	of type character array (string)
No_of_travellers	of type integer
No_of_buses	of type integer

Public Members :

A constructor to assign initial values of TravelCode as 201, Place as "Nainital", No_of_travellers as 10, No_of_buses as 1

A function NewTravel() which allows user to enter TravelCode, Place and No_of_travellers. Also, assign the value of No_of_buses as per the following conditions :

No_of_travellers	No_of_buses
Less than 20	1
Equal to or more than 20 and less than 40	2
Equal to 40 or more than 40	3

A function ShowTravel( ) to display the content from all the data members on screen.

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

```
class Drug
{
    char Category[10];
    char Date_of_manufacture[10];
    char Company[20];
public:
    Drug();
    void enterdrugdetails();
    void showdrugdetails{);
};
class Tablet : public Drug
{
protected:
    char tablet_name[30];
    char Volume_label[20];
public:
    float Price;
    Tablet();
    void entertabletdetails();
    void showtabletdetails();
};
    class PainReliever : public Tablet
{
    int Dosage_units;
    char Side_effects[20];
    int Use_within_days;
public:
    PainReliever();
    void enterdetails();
    void showdetails();
};
```

(i) How many bytes will be required by an object of class Drug and an object of class PainReliever respectively ?

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(ii) Write names of all the data members which are accessible from the object of class PainReliever.

(iii) Write names of all the members accessible from member functions of class Tablet.

(iv) Write names of all the member functions which are accessible from objects of class PainReliever.

3. (a) Write a function in C++ which accepts an integer array and its size as arguments/parameters and exchanges the values of first half side elements with the second half side elements of the array. 3

Example :

If an array of eight elements has initial content as
    8, 10, 1, 3, 17, 90, 13, 60
The function should rearrange the array as
    17, 90, 13, 60, 8, 10, 1, 3

(b) An array Arr[35][15] is stored in the memory along the row with each of its element occupying 4 bytes. Find out the base address and the address of an element Arr[20][5], if the location Arr[2][2] is stored at the address 3000. 4

(c) Write a function in C++ to perform a DELETE operation in a dynamically allocated queue considering the following description : 4

```
struct Node
{
    float U,V;
    Node *Link;
};
class QUEUE
{
    Node *Rear,*Front;
public:
    QUEUE(){Rear=NULL;Front=NULL;}
    void INSERT();
    void DELETE();
    ~QUEUE();
};
```

(d) Write a function in C++ to print the sum of all the values which are either divisible by 3 or are divisible by 5 present in a two dimensional array passed as the argument to the function. 3

(e) Evaluate the following postfix notation of expression : 2
    20 10 + 5 2 * – 10 /

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4. (a) Observe the program segment given below carefully, and answer the question that follows : 1

```
class Member
{
    int Member_no;
    char Member_name[20];
public :
    //function to enter Member details
    void enterdetails{} ;
    // function to display Member details
    void showdetails();
    //function to return Member_no
    int RMember_no() {return Member_no; }
};
void Update(Member NEW)
{
    fstream File;
    File.open("MEMBER.DAT",ios::binary|ios::in|ios::out);
    Member OM;
    int Recordsread = 0, Found = 0;
    while (!Found && File.read((char*)&OM, sizeof(OM)))
    {
        Recordsread ++;
        if (NEW.RMember_no() == OM.RMember_no())
        {
            _____//Missing Statement
            File.write((char*)&NEW, sizeof(NEW));
            Found = 1;
        }
        else
            File.write((char*)&OM, sizeof(OM));
    }
    if (!Found)
        cout<<"Record for modification does not exist";
    File.close();
}
```

If the function Update ( ) is supposed to modify a record in file MEMBER.DAT with the values of Member NEW passed to its argument, write the appropriate statement for **Missing Statement** using seekp( ) or seekg( ), whichever needed, in the above code that would write the modified record at its proper place.

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(b) Write a function in C++ to count and display the number of lines not starting with alphabet 'A' present in a text file 'STORY.TXT".   2

Example :
If the file "STORY.TXT" contains the following lines,

The rose is red.
A girl is playing there.
There is a playground.
An aeroplane is in the sky.
Numbers are not allowed in the password.

The function should display the output as 3

(c) Given a binary file APPLY.DAT, containing records of the following class Applicant type   3

```
class Applicant
{
    char A_Rno[10];              //Roll number of applicant
    char A_Name[30];            //Name of applicant
    int A_Score;                //Score of applicant
public:
    void Enrol()
    {
        gets(A_Rno); gets(A_Name) ; cin>>A_Score;
    }
    void Status()
    {
        cout<<setw(12)<<A_Admno;
        cout<<setw(32)<<A_Name;
        cout<<setw(3)<<A_Score<<endl;
    }
    int ReturnScore(){return A_Score;}
};
```

Write a function in C++, that would read contents of file APPLY.DAT and display the details of those Students whose A_ Score is below 70.

5.   (a) What do you understand by the terms **Candidate Key** and **Cardinality of a relation** in relational database ?   2

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

WORKERS

W_ID	FIRSTNAME	LASTNAME	ADDRESS	CITY
102	Sam	Tones	33 Elm St.	Paris
105	Sarah	Ackerman	440 U.S. 110	New York
144	Manila	Sengupta	24 Friends Street	New Delhi
210	George	Smith	83 First Street	Howard
255	Mary	Jones	842 Vine Ave.	Losantiville
300	Robert	Samuel	9 Fifth Cross	Washington
335	Henry	Williams	12 Moore Street	Boston
403	Ronny	Lee	121 Harrison St.	New York
451	Pat	Thompson	11 Red Road	Paris

DESIG

W_ID	SALARY	BENEFITS	DESIGNATION
102	75000	15000	Manager
105	85000	25000	Director
144	70000	15000	Manager
210	75000	12500	Manager
255	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman
451	28000	7500	Salesman

(i)   To display W_ID, Firstname, Address and City of all employees living in New York from the table WORKERS.

(ii)   To display the content of WORKERS table in ascending order of LASTNAME.

(iii) To display the Firstname, Lastname, and Total Salary of all Clerks from the tables WORKERS and DESIG, where Total Salary is calculated as Salary + Benefits.

(iv) To display the Minimum salary among Managers and Clerks from the table DESIG.

(v)   SELECT FIRSTNAME, SALARY
      FROM WORKERS, DESIG
      WHERE DESIGNATION = 'Manager' AND
      WORKERS.W_ID=DESIG.W_ID;

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```
(vi) SELECT COUNT(DISTINCT DESIGNATION) FROM DESIG;
(vii) SELECT DESIGNATION, SUM(SALARY)
     FROM DESIG
     GROUP BY DESIGNATION HAVING COUNT(*)<3;
(viii) SELECT SUM(BENEFITS)
     FROM WORKERS
     WHERE DESIGNATION = 'Salesman';
```

6. (a) State and verify Absorption law in Boolean Algebra. 2

(b) Write the equivalent Boolean expression for the following Logic Circuit : 2
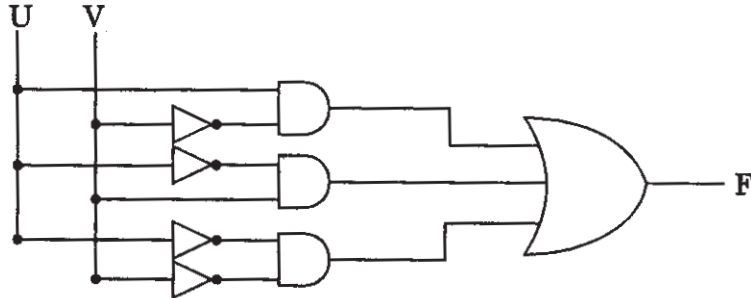
(c) Write the POS form of a Boolean Function F, which is represented by the following truth table : 1

X	Y	Z	F
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

(d) Reduce the following Boolean expression using K - Map : 3
   $F (A, B, C, D) = \Sigma (0, 1, 2, 3, 4, 5, 10, 11, 15)$

7. (a) Compare Optical Fiber and Coaxial transmission media. 1

(b) Expand the following terminologies : 1
   (i)   HTML
   (ii) GSM

(c) What is the difference between XML and HTML ? Write two differences. 1

(d) What do you understand by the terms Cookies and Firewall ? 1

(e) The Cyber Mind Organisation has set up its new Branch at Mizoram for its office and web based activities. It has 4 Wings of buildings as shown in the diagram :
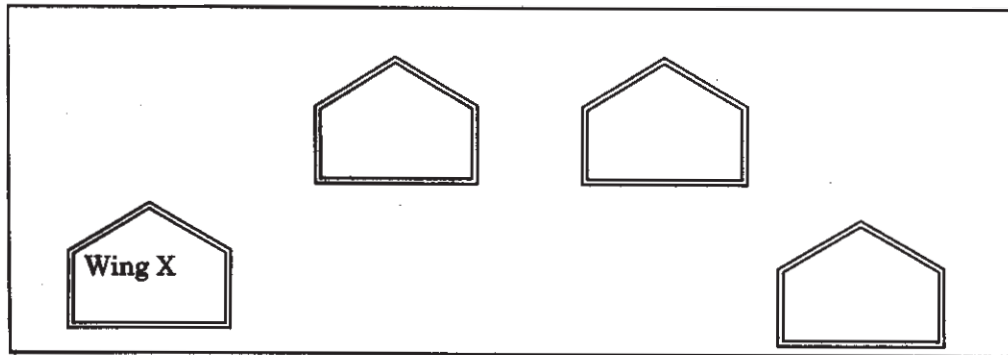
Center to center distance between various blocks

Wing X to Wing Z	40 m
Wing Z to Wing Y	60 m
Wing Y to Wing X	135 m
Wing Y to Wing U	70 m
Wing X to Wing U	165 m
Wing Z to Wing U	80 m

Number of Computers

Wing X	50
Wing Z	130
Wing Y	40
Wing U	15

(el) Suggest a most suitable cable layout of connections between the Wings and topology. 1

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

(e3) Suggest the placement of the following devices with justification : 1
  (i) Repeater
  (ii) Hub/Switch

(e4) The organization is planning to link its head office situated in Delhi with the offices as Mizoram. Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer. 1

Marking Scheme — Computer Science

General Instruction :

1. The answers given in the marking scheme are merely suggestive;

   Examiners are requested to consider all alternative correct answers conveying the similar meaning.

2. All programming questions -have to be answered with respect to C++ language only.

3. In SQL related questions - both ways text i.e. character entries should be acceptable.

   (For example: 'Amar' or "Amar")

4. In SQL related questions - ignore semicolon/termination for queries.

5. In SQL related questions - ignore case sensitivity.

6. In C++ questions — Ignore case sensitivity for function names and variable names.

QUESTION PAPER CODE 91/1

EXPECTED ANSWERS/VALUE POINTS

1. (a) Call by value :

   The formal parameter makes a copy of actual parameter. It does not make the changes in actual parameter if the changes are done in formal parameters.

   Call by reference :

   The formal parameter is an alias of actual parameter. The changes made in the formal parameter are reflected in actual parameter. It is preceded by &.

   ```
   void Calculate(int A,int &B)//A is call by value, B is call by reference
   {
       A++;
       B+=A;
   }
   ```

   [1/2 Mark for each correct definition]
   [1/2 Mark for each suitable example]
   OR
   [Full 2 Marks for suitable self-explanatory example]

   (b) (i) math.h
   (ii) string.h

   [½ Mark for each correct header file]

(c)
```
#include <iostream.h>
const int Multiple=3;
void main ()
{
   int Value=15;
   for (int Counter = 1;Counter<=5;Counter++,Value-=2)
      if (Value%Multiple==O)
          cout<<Value * Multiple<<endl;
      else
          cout<<Value+Multiple<<endl;
}
```
OR
```
#include <iostream.h>
const int Multiple=3;
void main ()
{
   int Value=15;
   for (int Counter = 1;Counter<=5;Counter++,Value-=2)
      if (Value%Multiple==O)
      {
          cout<<Value * Multiple;
          cout<<endl;
      }
      else
          cout<<Value+Multiple<<endl;
}
```
[1/2 Mark for each correction]
OR
[Only 1/2 for only identifying all the errors]

(d)   10×15×6
      11×16×6
      10×16×11

[1 Mark for each line of correct output]
OR
[½ mark for partial answers i.e, upto two correct numbers in each line]
Note: Deduct ½ mark for not considering endl from the total marks obtained in this question.

(e)   cbse*eXAM*3116
      6113*MXAe*esbc

[1 Mark for each line of correct output]
OR
[½ mark for partial answers in each line for any

two sets of strings cbse*eXAM OR eXAM*3116 OR 6113*MXAe OR MXAe*esbc**]**

Note: Deduct ½ mark for not considering endl from the total marks obtained in this question

(f) (iii) 1 2 3 4 5 6 7 8 9

OR

(iii)

The minimum value Rndnum will take is 5

[1½ Mark for correct output option]

[½ Mark for suitable justification]

2.   (a) Data hiding is a method of keeping the data in private or protected visibility modes to avoid their access From outside its scope.

For example:

```
class  Sample
{
    int Data;  //Data will not be accessible from the object
public:
    void  Function( );
} ;
```

[1 mark for defining the term Data Hiding]

[1 mark for any valid illustration or explanation with/without program segment]

OR

[Full 2 Marks for suitable self-explanatory example]

(b) (i)   Constructor Overloading

OR

Function Overloading

OR

Polymorphism

[1 mark for mentioning any of the above or similar term]

OR

[Only ½ mark for mentioning just as Constructor]

(ii) Test T("Computer Science");
Test T("Computer Science", 60);

[½ mark for each statement]

Note : If a student mentions about error (i.e. missing ;) give 1 mark out of 2 marks.

(c)
```
class TravelPlan
{
    long PlanCode;
    char Place[20];
    int Number_of_travellers;
    int Number_of_buses;
public:
    TravelPlan();
    void NewPlan();
    void ShowPlan()
};
TravelPlan::TravelPlan()
{
    PlanCode=1001;
    strcpy(Place,"Agra");
    Number_of_travellers=5;
    Number_of_buses=1;
}
void TravelPlan::NewPlan()
{
    cin>>PlanCode;
    gets(Place);
    cin>>Number_of_travellers;
    if (number_of_travellers<20)
        numer_of_buses=1;
    else if (number_of_travellers<40)
        numer_of_buses=2;
    else numer_of_buses=3;
}
void TravelPlan::ShowPlan()
{
    cout  <<PlanCode<<endl<<Place<<endl
          <<Number_of_travellers<<endl
          <<Number_of_buses<<endl;
}
```

[½ Mark for using the correct syntax of the class including private (the default one) and public visibility modes]

[1 Mark for declaring all the data members in private]

[1 Mark for correct constructor function]

[1 Mark for correct definition of NewPlan() function with appropriate if condition]

[½ Mark for correct definition of ShowPlan() function]

OR

[1 Mark if only Function Prototypes are mentioned]

(d) (i)   class Medicines : 40
          class Antibiotics : 118
          [½ mark for writing each correct answer]

(ii) ```
      entermedicinedetails ( )
      showmedicinedetaiDs ( )
      entercapsuledetails ( )
      showcapsuledetails ( )
      enterdetails ( )
      showdetails ( )
      ```
      **[1 mark for fully correct answer; Ignore the Constructors]**

(iii) ```
      entermedicinedetails()
      showmedicinedetails()
      entercapsuledetails()
      showcapsuledetails ()
      capsule_name
      Volume_label
      Price
      ```
      [1 mark for correct answer; Ignore the Constructors]

(iv) Price
      [1 mark for correct answer]

3. (a)
```
void Exchange (int A [ ], int N)
{
    for (int I=0;I<N/2;I++)
    {
        int Temp=A[I];
        A[I]=A[N/2+I];
        A[N/2+I]=Temp;
    }
}
```
OR
```
void Exchange(int A[], int N)
{
    for (int I=0,J=N/2;I<N/2;I++,J++)
    {
        int Temp=A[J];
        for (int K=J;K>I;K--)
            A[K]=A[K-1];
        A[I]=Temp ;
    }
}
```

OR

```
void Exchange(int A[], int N)
{
    int M=(N%2==0)?N:N+1;
    for (int I=0; I<M/2; I++)
    {
        int Temp=A[I];
        A[I]=A[M/2+I];
        A[M/2+I]-Temp;

    }

}
```

OR

Any other equivalent logic producing the correct result

[1 Mark for function header]

[1 Mark for correct formation of loop]

[1 Mark for exchanging the content correctly]

(b)
```
LOC(Arr[I][J] )=Base(Arr)+W*(I + No.of Rows  *  J )
LOC(Arr[5][10]) =Base(Arr)+8*(5+15*10)
4000            =Base(Arr)+8*(155)
4000            =Base(Arr)+1240
Base(Arr)       =4000-1240
Base(Arr)       =2760

LOC(Arr[2][5])  =Base(Arr)+8*  (2  +  15*5)
                =2760+8*(77)
                =2760+616
                =3376
```

OR

```
LOC(Arr[I][J]) =Base(Arr)+W*(  (I-1)  +  No.  of Rows  *  (J-1)  )
LOC(Arr[5][10]) =Base(Arr)+8*[(5-1)+15*  (10-1)]
4000            =Base(Arr)+8*(139)
4000            =Base(Arr)+1112
Base(Arr)       =4000-1112
Base(Arr)       =2888

LOC(Arr[2][5])  =Base(Arr)+  8*[(2-1)+15*(5-1)]
                =2888+8*(61)
                =2888+488
                =3376
```

[1 Mark for correct formula OR correct substitution in the formula]

[1 Mark for <u>calculation</u> of base address at least one line after the substitution]

[1 Mark for <u>calculation</u> of required address at least one line after the substitution]

[1 Mark for correct result]

(c)
```
void STACK::PUSH()
{
    Node*Temp;
    Temp = new Node;
    cin>>Temp->X>>Temp->Y;
    Temp->Link=Top;
    Top=Temp;
}
```

OR

Any other equivalent code

[1 Mark for correct function header i.e. using :: scope resolution operator]
[1 Mark for creating an empty node and assigning its address to a pointer]
[1 Mark for assigning values to X and Y]
[½ Mark each for assigning correct value to the Link and updating Top]

(d)
```
void Div2or3(int A[][5],int N,int M)
{
    int Sum=0;
    for (int I=0; I<N; I++)
        for (int J=0; J<M; J++)
            if (A[I][J]%2==0 || A[I][J]%3==0)
                Sum+=A[I][J];
    cout<<Sum;                              //Ignore
}
```

OR

```
int Div2or3(int A[][5],int N,int M)
{
    int Sum=0;
    for (int I=0;I<N;I++)
        for (int J=0;J<M;J++)
            if (A[I][J]%2==0 || A[I][J]%3==0)
                Sum+=A[I][J];
    return Sum;                             //Ignore
}
```

OR

Any other equivalent code
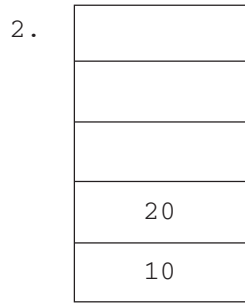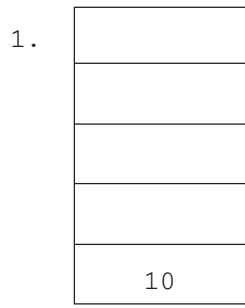
[½ Mark for correct function header]
[½ Mark for initializing Sum]
[½ Mark for each of the loop]
[½ Mark for divisibility check for 2 and 3]
[½ Mark for finding the sum]

(e) `10  20 + 25 15 - * 30 /`

1.

10

2.

20
10

3.

10

OP2=20

OP1=10

\+

OP2=20

30

4.

25
30

5.

15
25
30

290

6.

	OP2=15		OP1=25	
			–	
			OP2=15	
25				10
10		30		30

7.

	OP2=10		OP1=30	
			*	
			OP2=10	
30				300

8.

30
300

9.
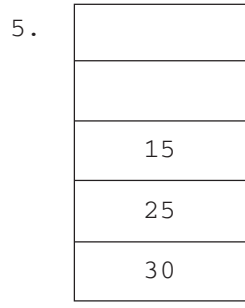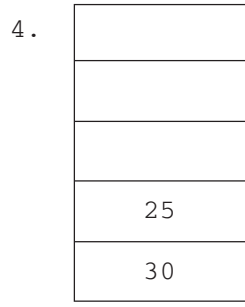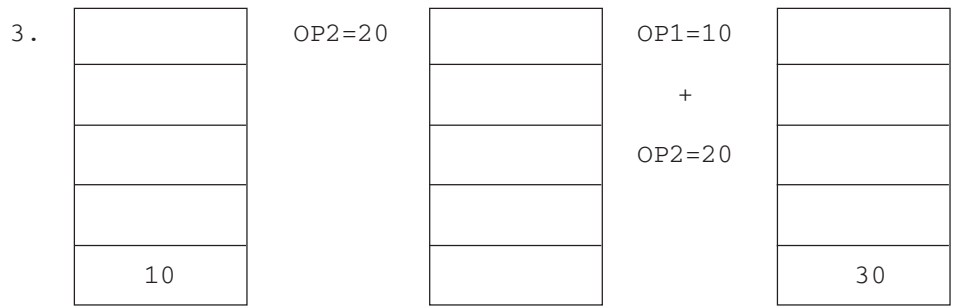
	OP2 = 30		OP1=300	
			/	
			OP2=30	
300				10

10.

	Pop
	Result
	10

OR

Operand/Operator	Stack Status
10	10
20	10,20
+	30
25	30,25
15	30,25,15
–	30,10
*	300
30	300,30
/	10

Result : 10

[½ Mark <u>each</u> for any three operators operation using stack]
[½ Mark for final result as 10]

4.   (a) `File.seekp((Recordsread-1)*sizeof(NEW));`
OR
`File.seekp(-sizeof(NEW), ios::curr);`
OR
`File.seekp(File.tellg()-sizeof(NEW) );`
OR
Any other equivalent code

[1 mark for writing the correct statement as above or any equivalent]

(b)
```
void counter( )
{
    char Aline[80];
    int Count=0;
    ifstream Fin ("LINES.TXT");
    while(Fin.getline(Aline,80, '\n'))
      if (Aline[0]== 'A')
         Count++;
    Fin.close( );
    cout<<Count<<endl;

}
```
[½ mark for reading a line from the text file]
[½ mark for checking the beginning alphabet as 'A']
[½ mark for correctly incrementing the counter]
[½ mark for correctly displaying/returning the counter]

(c)
```
void Distinction()
{
    Student S;
    fstream Fin;
    Fin.open("STUDENT.DAT", ios::binary|ios::in);
    while(Fin.read((char*)&S, sizeof(Student))
        if (S.ReturnPercentage()>75)
            S.DisplayData();
    Fin.close();
}
```

[½ Mark for opening the file or initializing the object of file stream]

[1 Mark for checking eof & performing read operation from the <u>binary</u> file]

[1 Mark for checking the required condition i.e. >75]

[½ Mark for displaying the content of the required record]

5.   (a)   Primary Key: The attribute (Column) or set of attributes (Columns) which is used to identify a tuple/row uniquely are known as Primary Key.

Degree of a relation: Number of attribute or column in a table form cardinality of a relation.

[1 Mark each for giving correct definition]
OR
[1 Mark each for explaining the concept using suitable example]

(b) (i)   Select FIRSTNAME, LASTNAME, ADDRESS, CITY From EMPLOYEES
           Where CITY= 'Paris';

[½ Marks for each part (here parts are separated into lines for convenience) of correct SQL Command]

(ii)   Select * From EMPLOYEES
       Order By FIRSTNAME;

[½ Marks for each part (here parts are separated into lines for convenience) of correct SQL Command]

(iii)   **Select FIRSTNAME, LASTNAME, SALARY From EMPLOYEES, EMPSALARY**
        Where EMPLOYEES.EMPID=EMPSALARY.EMPID;

[½ Marks for each part (here parts are separated into lines for convenience) of correct SQL Command]

(iv) `Select Max(SALARY) From EMPSALARY`
     `Where DESIGNATION = 'Manager' OR DESIGNATION = 'Clerk';`

[½ Marks for each part (here parts are separated into lines for convenience) of correct SQL Command]

(v) FIRSTNAME   SALARY
    Rachel   32000
    Peter   28000

Note: Heading is Optional

[½ Mark for correct result]

(vi) COUNT (DISTINCT DESIGNATION)
     4

Note: Heading is Optional

[½ Mark for correct result]

(vii) DESIGNATION   SUM(SALARY)
      Manager   215000
      Clerk   135000

Note: Heading is Optional

[½ Mark fdr correct result]

(viii) **(½ Mark for mentioning the error)**
       OR
       (½ Mark for attempting this part of the question)
       OR
       (½ Mark for correctly attempting any two part of the SQL question)

6. (a) Associative Laws of Boolean Algebra:
    A.(B.C) = (A.B).C

    OR

    A+(B+C) = (A+B)+C
    Verification of A.(B.C) = (A.B).C

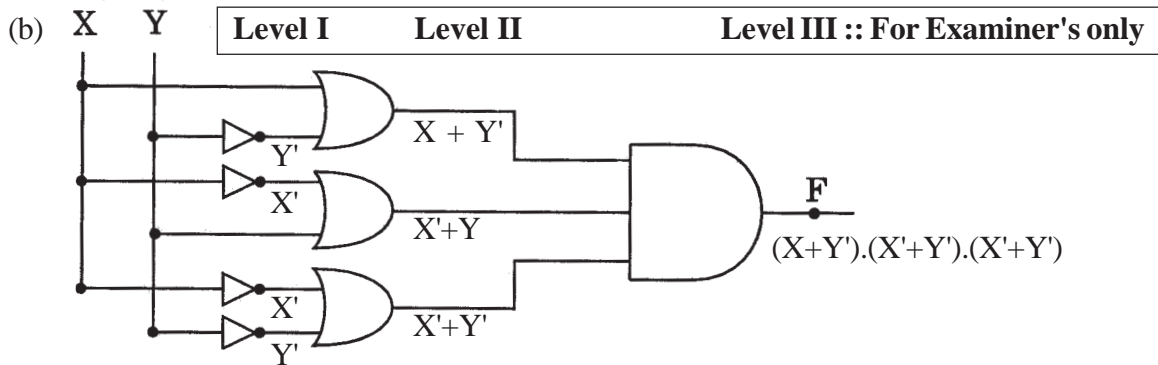| A	B	C	B.C	A.(B.C)	A.B	(A.B).C
0	0	0	0	0	0	0
0	0	**1**	0	0	0	0
0	1	0	0	0	0	0
0	1	1	1	0	0	0
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	0	1	0
1	1	1	1	1	1	1

OR

Verification of A+(B+C) = (A+B)+C

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

[1 mark for stating ANY ONE Associative Law]

[1 mark for verification of ANY ONE Associative Law using Truth Table/algebraically]

(b)

[Full 2 marks for writing Correct Expression for Level III]

[Only 1½ mark, if Level II expressions are correctly written and Level III is wrong]

[½ mark if only Level I expressions are correct]

(c) A'.B'.C' + A'.B.C + A.B.C' + A.B.C

[1 mark for correct SOP expression]

[½ mark if ONLY one term of the expression is wrong]

(d) F (A, B, C, D) = Σ(6, 7, 8, 9, 12, 13, 14)

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

$F(A, B, C, D) = A.C' + A'.B.C + B.C.D'$

OR

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

$F(A, B, C, D) = A.C' + A'.B.C + B.C.D'$

OR

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

$F(A, B, C, D) = (A + C) . (B + C') . (A' + C' + D')$

OR

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

$F(A, B, C, D) = (A+C) . (B + C') . (A'+C'+D')$

**[½ mark for Drawing The K-Map Correctly]**

[½ mark for placing the 1s/0s at correct positions]

[½ Mark for grouping in the K-Map]

[½ Mark for each reduced term]

Note : Deduct ½ Mark for extra redundant term(s)/grouping(s)

7. (a) **Message switching:** The saurce computer sends data (message) to the switching office, which stores data in a buffer. It then looks for a free link to another switching office and sends data to that office. This process continues until data is delivered to the destination computer. This type of switching technique is also known as 'store and forward' switching.
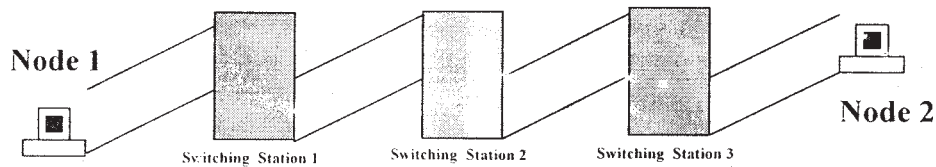
Packat switching: A fixed size of packet that can be transmitted across the network is specified. All the packets are stored in the main memory instead of disk. As a result accessing time of packets is reduced.
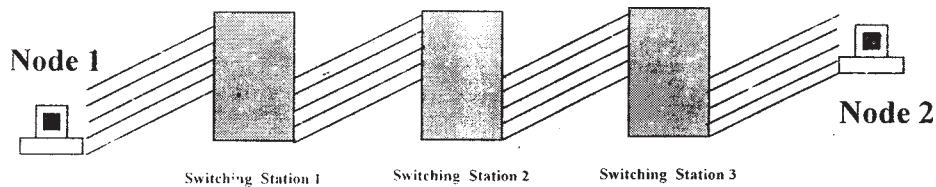
[½ Mark for defining each of them]

OR

[½ Mark for diagrammatic representation of each of them]

(b) (i) Tranmission Control Protocol/Internet Protocol

(ii) eXtensible Markup Language OR extendable Markup Language

(iii) Code Division Multiple Access

(iv) Wireless in a Local Loop

[½ Mark for expanding each of them]

(c) Cyber law encompasses a wide variety of political and legal issues related to the Internet and other communications technology, including intellectu \\ property, privacy, freedom of expression, and jurisdiction.

[1 Mark for writing any one correct application]

(d) (i) **[½ Mark for drawing / mentioning any suitable cable layout]**
[½ Mark for mentioning the topology]

(ii) Wing Y as it has largest number of computers

[½ Mark for mentioning Wing Y]
[½ Mark for suitable justification]

(iii) **[½ Mark for mentioning Switch/Hub placement in each of the building]**
[½ Mark for suggesting the placement of repeater for the distances higher than 70 m]

(iv) TCP/IP Dial Up   (Most Suitable answer 1)

OR

Telephone Link   (Most Suitable answer 2)

OR

Microwave

OR

Radio Link/Radio Wave

OR

Satellite Link

OR

WAN

[½ Mark for mentioning any of the above]
[½ Mark for giving any suitable reason for any of the above]

QUESTION PAPER CODE 91

EXPECTED ANSWERS/VALUE POINTS

1. (a) Default Constructor: It is type of constructor, which does not have any parameter.

OR

Default Constructor: It is the pre-defined constructor.

Copy Constructor: It is an overloaded constructor in which object of the same class is passed as parameter.

OR

Copy Constructor: It is a constructor, which is used to copy content of one object to another of the same class.

```
class STUDENT
{
    int Rno;
    char Name[20];
public:
    STUDENT();          //Default Constructor
    STUDENT(STUDENT &S); //Copy Constructor
    :
    :
};
```

(½ Mark for each definition)

(½ Mark for each example)

OR

(Full 2 Marks to be given for self explanatory example)

(b) (i)   stdio.h

(ii)   ctype.h

(½ Mark for each correct header file)

(c)
```
#include <iostream.h>
const int Dividor=5;
void main()
{
    int Number = 15;
    for (int Count = 1;Count<=5;Count++,Number-=3)
    if (Number%Dividor==0)
    {
        cout<<Number/Dividor;    OR
        cout<<endl;              cout<<Number/Dividor<<endl;
    }
    else
        cout<<Number+Dividor<<endl;
}
```

(½ Mark for each correction)

OR

(Only ½ for only identifying all the errors)

(d) 101×150×50

101×152×50

101×202×49

(1 Mark for <u>each</u> line of correct output)
OR
(½ mark for partial answers in <u>each</u> line upto two correct numbers)

Note: Deduct ½ mark for not considering endl from the total marks obtained in this question, Deduct ½ mark for not mentioning 'X' in between the numbers.

(e) `3116*tESTS*AHEAD`

`DAEHA*SSTEt*6113`

(1 Mark for <u>each</u> line of correct output)
OR
(½ mark for partial answers in <u>each</u> line for any two sets of strings [3116* tests] OR [tests*AHEAD] OR [DAEHA*SSTEt] OR [SSTEt*6113])

Note: Deduct ½ mark for not considering endl from the total marks obtained in this question. Deduct ½ mark for not mentioning '*' in between the numbers.

(f) (ii) `1 2 3 4 5 6 7 8 9 10 11`

The minimum value Rndnum will take is 7

(1 Mark for correct output option)
(1 Mark for suitable justification)

2. (a) Data Encapsulation: Wrapping up of data and functions together in a single unit is known as Data Encapsulation.

Example:

```
class Item      //Class wraps Data & Functions together in a single unit
{
    int  Ino;
    char Desc[20];
public:
    void  Purchase();
    void  Sale();
};
```

(1 Mark for definition)
(1 Mark for example)
OR
(Full 2 Marks to be given for self explanatory example)

(b) (i) Exam E(90);
         OR
         E.Exam::Exam(45);

         Exam F("Physics",50);
         OR
         E.Exam::Exam("Hindi",40);

         (½ Mark for each statement)

   (ii) Constructor Overloading   (Most suitable answer)
         OR
         Polymorphism
         OR
         Function Overloading

         (1 Mark for mentioning any of the above)

(c)
```
class  Travel
{
    long  TravelCode;
    char  Place[25];
    int  No_of_travellers,No_of_buses;
public:
    Travel();
    void  NewTravel();
    void  ShowTravel();
};
  Travel::Travel()
{
    TravelCode=201;
    strcpy(Place,"Nainital");
    No_of_travelers=10;
    No_of_buses=1;
}
void  Travel::NewTravel()
(
    cin>>Travelcode;
    gets(Place);
    cin>>No_of_travellers;
    if  (No_of_travellers<20)
```

```
        No_of_buses=1;

    else if (No_of_travellers<40)

        No_of_buses=2;

    else

        No_of_buses=3;

}

void Travel::ShowTravel()

{

    cout<<"Travel Code="<<TravelCode;

    cout<<"Place="; puts(Place);

    cout<<"No of travellers="<<No_of_travellers;

    cout<<"no of buses="<<No__of_buses;

}
```

**(½ Mark for using the correct syntax of the class including private
[the default one] and public visibility modes)
(1 Mark for declaring all the data members in private)
(1 Mark for correct constructor function)
(1 Mark for correct definition of NewTravel( ) function)
(½ Mark for correct definition of ShowTravel( ) function)**

(d) (i)   Class Drug   40 bytes
          Class PainReliever   118 bytes

   (½ Mark for each answer)

   (ii) price

   (1 Mark for the correct answer)

   (iii) entertabletdetails( )
         showtabletdetaiis( )
         enterdrugdetails( )
         showdrugdetails( )
         tablet_name
         volume_label
         price

   Note: Ignore mention of Constructors

   **(1 Mark for the correct answer- Only if all the data members
   and member functions are correct)**

(iv) `entertabletdetails()`

    `showtabletdetails()`

    `enterdrugdetails()`

    `showdrugdetails()`

    `enterdetails();`

    `showdetails();`

Note: Ignore mention of Constructors

(1 Mark for the correct answer— Only if all the data members and member functions are correct)

3.   (a)
```
void Exchange(int A[],int N)
{
    for (int I=0;I<N/2;I++)
    {
        int Temp=A[I];
        A[I]=A[N/2+I];
        A[N/2+I]=Temp;
    }
}
```

OR

```
void Exchange(int A[],int N)
{
    for (int I=0,J=N/2;I<N/2;I++,J++)
    {
        int Temp=A[J];
        for (int K=J;K>I;K--)
                A[K]=A[K-1];
        A[I]=Temp;
    }
}
```

OR

```
void Exchange(int A[],int N)
{
    int M=(N%2=0)?N:N+1;
    for (int I=0;I<M/2;I++)
    {
        int Temp=A[I];
```

```
        A[I]=A[M/2+I];
        A[M/2+I]=Temp;
    }
}
```

OR

Any other equivalent logic producing the correct result

(1 Mark for function header)
(1 Mark for correct formation of loop)
(1 Mark for exchanging the content correctly)

(b)
```
LOC(Arr[I][J]) =Base(Arr)+W*(No. of Cols*I+J)

LOC(Arr[2][2]) =Base(Arr)+4*(15*2+2)
3000           =Base(Arr)+4*(32)
3000           =Base(Arr)+128
Base(Arr)      =3000-128
Base(Arr)      =2872

LOC(Arr[20][5])=Base(Arr)+4*(15*20+5)
               =2872+4*(300+5)
               =2872+4*305
               =2872+1220
               =4092
```

OR

```
LOC(Arr[I][J]) =Base(Arr)+W*(No. of Cols*(I-1)+(J-1)

LOC(Arr[2][2]) =Base(Arr)+4*(15*(2-1)+(2-1))
3000           =Base(Arr)+4*(16)
3000           =Base(Arr)+64
Base(Arr)      =3000-64
Base(Arr)      =2936

LOC(Arr[20][5])=Base(Arr)+4*(15*(20-1)+(5-1))
               =2936+4*(289)
               =2936+1156
               =4092
```

(1 Mark for correct formula OR correct substitution in the formula)
(1 Mark for calculation of base address at least one line after the substitution)
(1 Mark for calculation of required address at least one line after the substitution)
(1 Mark for correct result)

(c)
```
void QUEUE::DELETE()
{
    if (Front!=NULL)
    {
        Node *Temp=Front;
        Cout<<Temp->U<<Temp->V<<endl;      //Ignore
        Front=Front->Link;
        delete Temp;
        if (Front==NULL) Rear=NULL;         //Ignore
    }
    else
        cout<<"Queue is Empty"<<endl;       //Ignore
}
```

OR

Any other equivalent code

(½ Mark for correct function header i.e. using :: scope resolution operator)
(1 Mark for checking Queue Empty/Non-Empty condition)
(1 Mark for assigning the Front)
(1 Mark for updating the front by moving it to the next node i.e., using Link)
(½ Mark for using delete operator)

(d)
```
void Div3or5(int A[][3],int N,int M)
{
    int Sum=0;
    for (int I=0;I<N;I++)
       for (int J=0;J<M;J++)
          if (A[I][J]%3==0 || A[I][J]%5==0)
             Sum+=A[I][J];
    cout<<Sum;                      //Ignore
}
```

OR

```
int Div3or5(int A[ ][3],int N,int M)
{
    int  Sum=0;
```

```
      for (int  I=0;I<N;I++)
         for (int  J=0;J<M;J++)
            if (A[I][J]%3==0  ||  A[I][J]%5==0)
               Sum+=A[I][J];
      return  Sum;                          //Ignore

   }
```

OR

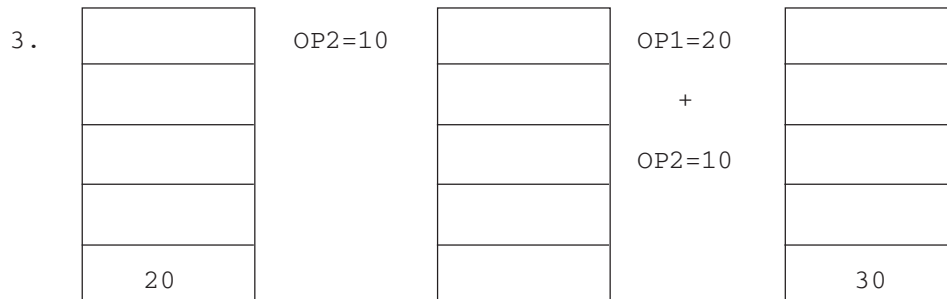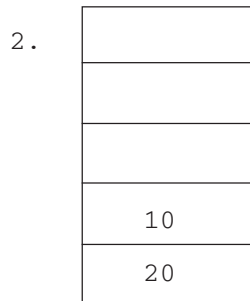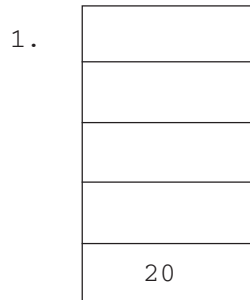Any other equivalent code

(½ Mark for correct function header)
(½ Mark for initializing Sum)
(½ Mark for <u>each</u> of the loop)
(½ Mark for divisibility check for 3 and 5)
(½ Mark for finding the sum)

(e) 20 10 + 5 2 * –10 /

1.

20

2.

10
20

3.

	OP2=10		OP1=20		
			+		
			OP2=10		
20					30

4.

5
30

5.

2
5
30

6.

	OP2=2		OP1=5	
			*	
			OP2=2	
5				10
30		30		30

7.

	OP2=10		OP1=30	
			–	
			OP2=10	
30				20

8.

10
20

307

9.

20		

OP2=10

OP1=20

/

OP2=10

2		

10.

Pop

Result

2
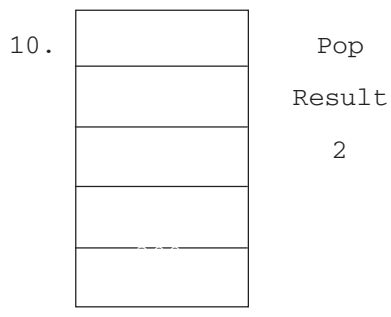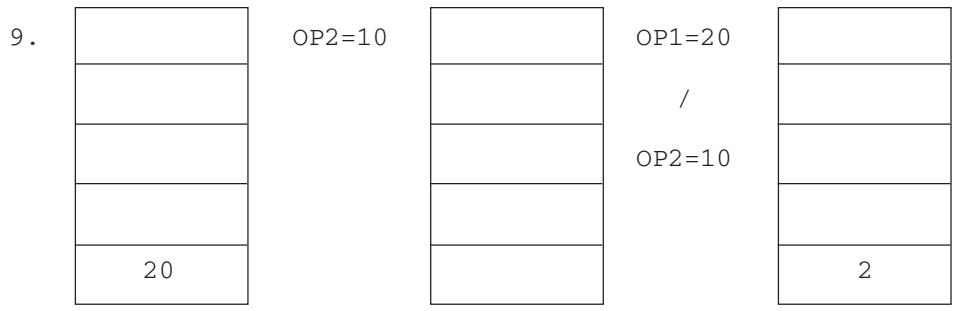
OR

20	20
10	20,10
+	30
5	30,5
2	30,5,2
+	30,10
–	20
10	20,10
/	2

Result : 2

(½ Mark for <u>each</u> for evaluation of any three operators using stack)
(½ Mark for final result as 2)

4.   (a)   `File.seekp((Recordsread-1)*sizeof(OM));`

OR

`File.seekp(Recordsread*sizeof(OM));`

OR

`File.seekp(-1*sizeof(OM),ios::curr);`

OR

```
File.seekp(file.tellg()-sizeof(OM));
```

OR

Any other equivalent

Note : `sizeof(OM)  OR  sizeof(Member)` <u>OR</u> `sizeof(NEW)are` equivalents

(½ Mark for using seekp)
(½ Mark for passing the correct position calculation)

(b)
```
void COUNTALINES()              //Ignore
{
    ifstream FILE("STORY.TXT");
    int CA=0;
    char LINE[80];
    while (FILE.getline (LINE,80))
        if (LINE[0]!='A')
            CA++;
    cout<<"Not Starting with A counts to "<<CA<<endl;
    FILE.close();              //Ignore
}
```

(½ Mark for initializing CA or Counter Variable and opening the file or initializing the file stream)
(½ Mark for checking eof & performing read operation from file)
(½ Mark for checking the condition for line not starting with 'A')
(½ Mark for incrementing and displaying the value of the counter variable)

(c)
```
void READAPPLY()                    //Ignore
{
    fstream FILE;
    FILE.open("APPLY.DAT",ios::binary|ios::in);
    Applicant A;
    while (FILE.read((char*)&A,sizeof(A)))
        if (A.ReturnScore()<70)
            A.Status();
    FILE.close();                   //Ignore

}
```

(½ Mark for opening the file or initializing the object of fife stream)

(1 Mark for checking eof & performing read operation from the binary file)

(½ Mark for displaying the content of the required record)

(1 Mark for checking the required condition with A.ReturnScore() function <70)

OR

(½ Mark for checking the required condition with A.Score <70)

5.   (a)   Candidate Key: The attribute (Column) or set of attributes (Columns) which can identify a tuple/row uniquely are known as Candidate Key(s).

OR

Candidate Key: The attribute (Column) or set of attributes (Columns), which are capable of acting as candidate for primary key.

Cardinality of a relation: Number of rows in a table form cardinality of a relation.

(1 Mark each for giving correct definition)
OR
(1 Murk each for explaining the concept using suitable example)

(b) (i)   SELECT W_ID,FIRSTNAME,ADDRESS,CITY FROM WORKERS WHERE CITY='New York';

            (½ Mark for correct SELECT FROM)
            (½ Mark for correct WHERE clause)

  (ii)   SELECT * FROM WORKERS ORDER BY LASTNAME;

            (½ Mark for correct SELECT FROM)
            (½ Mark for correct ORDER BY clause)

  (iii) SELECT FIRSTNAME, LASTNAME, SALARY+BENEFITS FROM WORKERS.DESIG WHERE DESIGNATION='CLERK' AND WORKERS,W_ID=DESIG.W_ID;
            OR
            SELECT FIRSTNAME,LASTNAME,SALARY+BENEFITS AS TOTAL SALARY FROM WORKERS.DESIG WHERE DESIGNATION='CLERK' AND WORKERS.W_ID=DESIG.W_ID;

            (½ Mark for correct SELECT FROM)
            (½ Mark for correct WHERE clause)

(iv) SELECT MIN(SALARY), DESIGNATION FROM DESIG WHERE DESIGNATION IN ('Manager'.'Clerk') GROUP BY DESIGNATION;

OR

SELECT MIN(SALARY), DESIGNATION FROM DESIG WHERE DESIGNATION= 'Manager' OR DESIGNATION='Clerk' GROUP BY DESIGNATION;

OR

SELECT MIN(SALARY) FROM DESIG WHERE DESIGNATION= 'Manager' OR DESIGNATION='Clerk';

OR

SELECT MIN(SALARY) FROM DESIG WHERE DESIGNATION IN ('Manager','Clerk');

(½ Mark for correct SELECT FROM)
(½ Mark for correct MIN function and WHERE clause)

(v)
```
Sam          75000
Manila       70000
George       75000
```

(½ Mark for the correct output)

(vi) 4

(½ Mark for the correct output)

(vii)
```
Director  85000
Salesman  60000
```

(½ Mark for the correct output)

(viii) **(½ Mark for mentioning the error)**
OR
(½ Mark for attempting this part of the question)
OR
(½ Mark for correctly attempting any two parts of the SQL question)

6.   (a)   Absorption Law:
      X+X.Y=X
      OR
      X.(X+Y)=X
      OR

X+X'.Y=X+Y

OR

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

X	Y	X.Y	X+X.Y
0	0	0	0
0	1	0	0
1	0	0	1
1	1	1	1

OR

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

OR

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

OR

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

OR

Algebraic Verification:

$$X+X.Y \quad =X$$
$$X.1+X.Y =X$$
$$X.(1+Y) =X$$
$$X.1 \qquad =X$$
$$X \qquad =X$$

OR

$$X.(X+Y) =X$$
$$XX+X.Y =X$$
$$X.1+X.Y =X$$
$$X.(1+Y) =X$$
$$X.1 \qquad =X$$
$$X \qquad =X$$

OR

$$X+X'.Y \qquad =X+Y$$
$$(X+X')(X+Y) =X+Y$$
$$1.(X+Y) \qquad =X+Y$$
$$X+Y \qquad =X+Y$$

OR

$$X(X'+Y) =X.Y$$
$$XX'+X.Y =X.Y$$
$$0+X.Y \quad =X.Y$$
$$X.Y \qquad =X.Y$$

(1 Mark for stating the absorption law)

(1 Mark for correctly verifying the law using truth table)

OR

(1 Mark for correct verification by using algebraic method)

(b) $U.V'+U'.V+U'.V$

(½ Mark for each term - full marks if all the terms are correct)

(c) $(X+Y'+Z)(X'+Y+Z).(X'+Y'+Z)(X'+Y'+Z')$

(1/2 Mark for each two terms)

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(d)

	A'B'	A'B	A.B	A.B'
C'D'	1 (0)	1 (4)	(12)	(8)
C'D	1 (1)	1 (5)	(13)	(9)
C.D	1 (3)	(7)	1 (15)	1 (11)
C.D'	1 (2)	(6)	(14)	1 (10)

	C'D'	C'D	C.D	C.D'
A'B'	1 (0)	1 (1)	1 (3)	1 (2)
A'B	1 (4)	1 (5)	(7)	(6)
A.B	(12)	(13)	1 (15)	(14)
A.B'	(8)	(9)	1 (11)	1 (10)

$F(A,B,C,D) = A'C' + B'.C + A.C.D$

(1 Mark for drawing the K-Map with right place values)

(½ Mark for grouping in the K-Map)

(½ Mark for each reduced term)

Note: Deduct ½ Mark for extra redundant term/groupings

7.   (a)   **Coaxial Cable:** Comparatively Slow, Economic, convenient to lay down, used in Bus topology of networks;

Optical Fibre: Very fast, expensive, reliable, no interference

(1 Mark for mentioning <u>any one valid</u> difference)

(b)   Hyper Text Markup Language

<u>Global System</u> for <u>Mobile</u> communication

(½ Mark for each correct expansion)

(c)   eXtensible Markup Language: It contains user defined tags

Hyper Text Markup Language: It contains predefined tags

(1 Mark for mentioning the difference)

OR

(½ Mark for only expansions of XML and HTML)

(d) **Cookies:** A small piece of information that a server sends to a client When you visit a Web site with cookie capabilities, its server sends certain information about you to your browser, which is stored on your hard drive as a text file. At some later time (such as returning to the site the next day), the server retrieves the cookie. It's a way toi the server to remember things about you.

Firewall: Any of a number of security schemes (hardware/software) that prevent unauthorized users from gaining access to **a** computer network or that monitor transfers of information to and from the network.

(½ Mark each for mentioning the key terms from the above or equivalent)

(e) (e1) **1 Mark to every one irrespective of attempt**

(e2) Wing Z as it has largest number of computers
(½ Mark for mentioning Wing Z)
(½ Mark for suitable justification)

(e3) **(Full 1 Mark for mentioning Switch/Hub placement in each of the building)**
OR
(Full 1 Mark for suggesting the placement of repeater for the distances higher than **70 m)**

(e4) TCP/IP Dial Up   (Most Suitable answer 1)
OR
Telephone Link   (Most Suitable answer 2)
OR
Microwave
OR
Radio Link/Radio Wave
OR
Satellite Link
OR
WAN

(½ Mark for mentioning any of the above)
(½ Mark for giving any suitable reason for any of the above)