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

**1.a)** What is the difference between Actual Parameter and Formal Parameters? Also, give a suitable C++ code to illustrate both.                    2

**(b)** Name the header file to which the following below:
     (i) abs( )    (ii) puts( )                    1

**(c)**Observe the following program and find out, which option or options out of (i) to (iv) will be expected output(s) from the program?  What will be the minimum and the maximum value assigned to the variable Test, if the value of C is 30?                    2

```cpp
#include<iostream.h>
#include<stdlib.h>
void main( )
{ int Test, Other[5]={10,30,20,40,50};
  randomize( );
  for (int C=1;C<5;C++)
  {
      Test=random(6-C-1);
      Cout<<Other[Test]<<'#';
  }
}
```

Possible Outputs:
  (i)20#20#30#10#
 (ii)50#30#10#10#
(iii)10#10#10#10#
(iv)40#40#30#10#

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

```cpp
#include<iostream.h>
#include<ctype.h>
void Encode(char Text[ ])
{
 for(int C=0;Text[C];C++)
 {
  char CH=(Text[C]>='a'&&Text[C]<='z')?Text[C]-32:Text[C];
  if(CH<='K'&&CH>='A')
           Text[C]='$';
  else if(CH=='E'||CH=='I'||CH=='M')
          Text[C]=Text[C]+32;
  else if(CH>='5'&&CH<='8')
           Text[C]='&';
  else if (CH>='a'&&CH<='z')
          Text[C]=toupper(CH);
  else
          Text[C]='*';
 }
}

void main()
{
  char Choice[] = "naVoDAya359NeW";
  cout<<endl<<endl;
```

```cpp
  Encode(Choice);
  cout<<Choice<<endl;
}
```

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

```cpp
include <iostream.h>
include <stdio.h>
class MyStudent
{ int StudentId=1001;
  char Name[20];
 public
  MyStudent( ) { }
  void Register( )
  { cin>>StudentId;
    gets(Name);
  }
  void Display( )
  { cout<<StudentId<<":"<<Name<<endl;
  }
};
void main( )
{  MyStudent MS;
   Register.MS( );
   MS.Display( );
}
```

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

```cpp
#include<iostream.h>
struct STOCK
{
   int Ino,Qty;
};
void Buy(STOCK &I,int TQ=2)
{
 I.Qty+=TQ;
}
void main( )
{
   STOCK I[2]={{100,150},{200,250}};
   Buy(I[1],5);
   cout<<I[1].Ino<<":"<<I[1].Qty<<endl;
   Buy(I[0],10);
   cout<<I[0].Ino<<":"<<I[0].Qty<<endl;
   Buy(I[1]);
   cout<<I[1].Ino<<":"<<I[1].Qty<<endl;
}
```

**(g)** Find the output of the following program:        1

```cpp
#include<iostream.h>
 void main( )
{ int U=15,V=25;
  cout<<"[A]"<<++U<<"&"<<V – 4 <<endl;
  cout<<"[B]"<<V++<<"&"<<U + 7 <<endl;
}
```

**2.a)** What do you understand by Polymorphism? Also, give an example in C++ to illustrate the same. **2**

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

```
class WORK
{ int WorkID;
  char WorkType;
public:
  ~WORK( )                 // Function 1
  {    cout<<"Un-Allocated"<<endl;
  }
  void status( )           // Function 2
  { cout<<WorkID<<";"<<WorkType<<endl;
  }
     WORK( )                // Function 3
     {
        WorkID=10;
        WorkType='T';
     }
     WORK(WORK &W)         // Function 4
     {
        WorkID=W.WorkID+12;
        WorkType=W.WorkType+1;
     }
};
```

(i)Which member function out of function1, function2, function3 and function4 shown in the above example of class WORK is called automatically, when the scope of an object gets over? Is it known as Constructor OR Destructor OR Overloaded Function OR Copy Constructor?

(ii) WORK W;               //Statement 1
    WORK Y (W);  //Statement 2

Which member function out of Function1, Function2, Function3 and Function4 shown in above definition of class WORK will be called on execution of statement written as Statement 2? What is this function specifically known as out of Destructor or Copy Constructor or Parameterized Constructor?

**(C)**Define a class **STATE** in C++ with following description : **4**
**Private members :**

Name  of  state (type string)
Population (long int)
Number of girls under 16 years of age attending school
          (long int)
Total number of girls under 16 years of age (long int)
A member function CALC_PER( ) to calculate & return the percentage of girls attending the school as ( Number of girls attending the school/Total number of girls*100)
**Public members :**

A constructor to initialize name of the state as "NOT ALLOTTED"
A function INSTATE( ) to allow user to enter data for all data members
A function OUTSTATE( ) to allow user to view the content of all the data members along with the percentage of girls attending the school.

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

```
class cloth
{   char category [5];
    char description [25];
protected :
    float price;
public :
    void entercloth ( );
    void displaycloth ( );
};
class design : protected cloth
{   char design [21];
protected :
    float cost;
public:
    int design;
    design ( )  {       }
    void enterdesign ( );
    void dispdesign ( );
};
class costing : public cloth
{   float desingfee;
        float stiching;
        float cal_cp ( );
protected:
        float costprice;
        float sellprice;
public:
        void entercost ( );
        void dispcost ( );
        costing ( );
};
```

(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?

**3.a)**A 2-dimensional array maintains the data for the temperature recorded in a city over a period of five months in a year as shown below: **2**

| Month Number 1-Jan,….12-Dec) | Average Temperature in $^0$C |
|---|---|
| 3 | 36 |
| 4 | 46 |
| 5 | 42 |
| 6 | 40 |
| 7 | 35 |

Write a function that will take the array and its size as parameters and display the following:
   i)       Average temperature as (sum of average/5)
   ii)      Display the name of the hottest month
   iii)
**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 element Arr[20][5] , if the location Arr[2][2] is stored at the address 3000. **3**

**c)** Write a function in C++ to perform insertion and deletion operation in a static circular Queue containing student information (represented with the help of an array of structure STUDENT)                4

```
struct STUDENT
{
    Int Admnno;
    char SName[20];
};
```

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

**(e)** Evaluate the following postfix notation of expression (Show status of stack after execution of each operation):   2

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

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

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

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

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

**(b)** Write a function in C++ to count the word "do" present in a text file "HAI.TXT                2

**(C)** 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.

**5.a)** Differentiate between Candidate key and Primary key in  context of RDBMS.                2

**(b)** Consider the following table *RESORT* and *OWNER*  and answer questions (A) and (B)

**Table : RESORT**

| RCODE | PLACE | RENT | TYPE | STARTDATE |
|-------|-------|------|------|-----------|
| R101 | GOA | 15000 | 5 Star | 23 Jan 2008 |
| R102 | HIMANCHAL | 12000 | 4 Stat | 12 Nov 2007 |
| R103 | KERALA | 12500 | 5 Star | 18 Mar 2006 |
| R104 | HIMANCHAL | 10900 | 3 Star | 09 Jan 2007 |
| R105 | GUJARAT | 8000 | 2 Star | 29 Apr 2008 |
| R106 | GOA | 16000 | 7 Star | 03 Mar 2003 |
| R107 | ORISSA | 9600 | 3 Star | 16 Oct 2005 |
| R108 | KERALA | 12000 | 4 Star | 12 Aug 2006 |
| R109 | HIMANCHAL | 8500 | 2 Star | 25 Jan 2004 |
| R110 | GOA | 12800 | 4 Star | 23 Feb 2008 |

**Table : OWNEDBY**

| PLACE | OWNER |
|-------|-------|
| GOA | SUN VILLAGE |
| KERALA | KTDC |
| HIMANCHAL | KALRA RESORTS |
| GUJARAT | KINJAL GROUP |
| ORISSA | OTDC |

**(A) Write SQL commands for the following statements: 4**

(i)  to display the RCODE and PLACE of all '2 Star' resorts in the alphabetical order of the place from table RESORT.
(ii)  to display the maximum & minimum rent for each type of resort from table RESORT.
(iii) to display the details of all resorts which are started after 31-Dec-04 from table RESORT.
(iv) to display the owner of all '5 Star' resorts from tables RESORT and OWNEDBY.

**(B) Give output for the following queries:                2**

(i)  SELECT  MIN(RENT)  FROM  RESORT  WHERE PLACE='KERALA';
(ii) SELECT TYPE, STARTDATE FROM RESORT WHERE TYPE='2 Star' ORDER BY STARTDATE;
(iii) SELECT PLACE, OWNER FROM OWNEDBY WHERE PLACE LIKE '%L';
(iv) SELECT RCODE, RENT FROM RESORT, OWNEDBY WHERE RESORT.PLACE=OWNEDBY.PLACE AND TYPE>='4 Star';

6. a) State and prove the absorption law algebraically.    2

(b) Write the POS form of a Boolean function H, in which is represented in a truth table as follows: 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 |

(c) Write the equivalent Boolean expression for the following logic circuit. 1
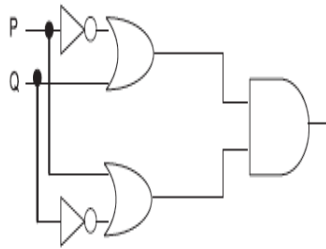


d) Reduce the following Boolean expression using K-map. (SOP) 3

$$F(w,x,y,z)=\sum(2,3,6,10,11,14)$$

(e) . Convert the following Boolean expression into its equivalent canonical product of sum form(POS) 1

A.B'C + A'.B.C + A'.B.C'.

**7.a)** Differentiate between message switching and packet switching. 2

**b**) Define Firewall 1

**c**) When do you prefer XML over HTML and why? 1

**d**) Compare freeware and shareware. 1

**e**) Mention any two advantages of Open Source Software over proprietary software. 1

e) "**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. 4
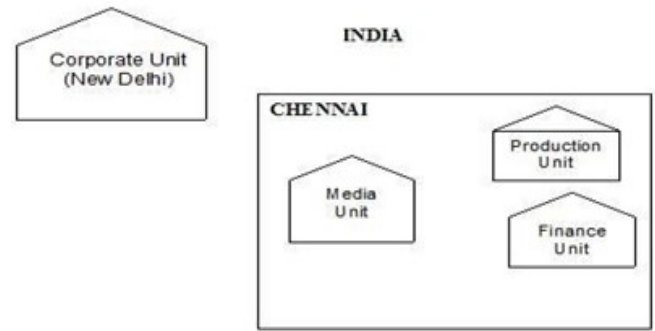


Approximate distances between these Units is as follows:

| 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 |

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.