Computer Science[083]

All questions compulsory
Programming language C++
Maximum Marks 100
Time Allotted 3 Hours

Question I

[a]   What is the difference between macro and inline?   [2]

[b]   Find the error(s) in the following program and rewrite the correct form: [2]
       Underline the corrections:

```
#include <iostream.h>
class phone
{ int no;
char areaphone;
int calls;
phone (int i=0, char b);
public:
phone (phone A)
{ no = A.no;
areacode = A.areacode;
}
~phone( )
{cout << "Destroying Object" <<--calls<< "\n";
}
};
phone (int i, char b)
{ no = i;
areacode = b;
}
void main( )
{ phone X, Y;
Y.no =10;
}
```

[c]   Write the names of the header files, which is/are essentially required to run/ex-
       ecute the following C++ code: [1]

```
void main()
{char CH,Text[ ]="+ve Attitude";
for(int i=0;Text[ i]='\0';i++)
if(Text[i]==' ')
cout<<endl;
else {CH=toupper(Text[i]);
cout<<CH;
}
}
```

[d] Rewrite the following program after removing the syntactical errors (if any). Underline each correction.   [1]

```
include<iostream.h>
typedef char [80] String;
void main( )
{String S="Peace";
int L=strlen(S);
cout<<S<<' has '<<L<<'characters'<<endl;
}
```

[e] Find the output of the following program: [3]

```
#include<iostream.h>
void SwitchOver(int A[ ], int N, int Split)
{ for (int K=0; K<N; K++)
if(K<Split)
A[K]+=K;
else
A[K]*=K;
}
void display(int A[ ], int N)
{ for(int K=0; K<N; K++)
(K%2==0) ? cout<<A[K]<<"%" : cout<<A[K]<<endl;
}
void main( )
{ int H[30, 40, 50, 20, 10, 5};
SwitchOver(H,6,3);
Display(H, 6);
}
```

[f] Find the output of the following program :   [2]

```
#iinclude<iostream.h>
void main( )
{ int *Queen, Moves [ ]={11,22,33,44};
Queen=Moves;
Moves[2]+=22;
cout<<"Queen @"<<*Queen<<endl;
*Queen-=11;
Queen+=2;
cout<<"Now @"<<*Queen<<endl;
Queen++;
cout<<"Finally @"<<*Queen<<endl;
Queen++;
cout<<"New Origin @"<<Moves[0]<<endl;
}
```

[g] Chose the correct alternative from the options (i)- (iv). Justify your answer. [2]

```
#include<iostream.h>
#include<stdlib.h>
#define Getval (N) ((N%2 = =0)? N+1:N+2)
void main( )
{ randomize( );
int num= random(3)+3;
```

```
for( int I= num ; I<=num+2 ;I++)
cout<<Getval(I)<<'@';
}
```
Options: a) 3@5@7@
              b) 7@7@9@
              c) 7@9@9@
              d) 7@9@11@

[h]   What is difference between Type Casting and Automatic Type Conversion? Also, give a suitable C++ to illustrate both.   [2]

Question II

[a]   Define a class PhoneBill in C++ with the following descriptions.   [4]
Private members:
CustomerName of type character array
PhoneNumber of type long
No_of_units of type int
Rent of type int
Amount of type float.
calculate( ) This member function should calculate the value of amount as Rent+ cost for the units.Where cost for the units can be calculated according to the following conditions.

        No_of_units Cost
        First 50 calls Free
        Next 100 calls 0.80 @ unit
        Next 200 calls 1.00 @ unit
        Remaining calls 1.20 @ unit

Public members:
* A constructor to assign initial values of CustomerName as "Raju", PhoneNumber as 259461, No_of_units as 50, Rent as 100, Amount as 100.
* A function accept ( ) which allows user to enter CustomerName, PhoneNumber, No_of_units and Rent and should call function calculate ( ).
* A function Display ( ) to display the values of all the data members on the screen.

[b]   Give differences between a copy and a parameterized constructor. Also use a suitable C++ code to support your answer.   [2]

[c]   Answer questions **1 and 2** after going through the following class: [2]
```
class game
{ char name[20]; int players;
public:
game (int, char*);        // MODULE 1
game (game&);             // MODULE 2
~game( );                 // MODULE 3
};
```
1. Define MODULE 2 outside the class.
2. Which OOP concept do MODULE1 and MODULE2 imply and what is MODULE2 called?
3. What is MODULE 3 known as? Which OOP concept do they imply?

[d]   Write the output of the following C++ code. Also, write the name of feature of Object Oriented Programming used in the following program jointly illustrated by the functions (i) to (iv):   [2]

```cpp
#include <iostream.h>
void Line( ) //Function (i)
{ for (int L=1; L<=80; L++) cout<<"-";
cout<<endl;
}
void Line(int N) //Function (ii)
{for(int L=1; L<=N; L++) cout<<"*"
cout<<endl;
}
void Line(char C, int N) //Function (iii)
{for(int L=1;L<=N;L++) cout<<C;
cout<<endl;
}
void Line(int M, int N) //Function (iv)
{for(int L=1; L<=n;L++) cout<<M*L;
cout<<endl;
}
void main()
{int A=9,B=4,C=3;
char K='#';
Line(K,B);
Line(A,C);}
```

[e]   Answer the questions (i) to (iv) based on the following: [4]
```cpp
class Student
{
         int Rollno;
         char SName[20];
         float Marks;
         protected:
         void Result( );
         public:
         Student( );
         void Enroll ( );
         void Display ( );
};
class Teacher
{
         long TCode;
         char TName [ 20];
         protected :
         float Salary;
         public :
         Teacher( );
         void Enter ( );
         void Show ( );
};
class Course : public Student, private Teacher
{
         long CCode[10];
```

```
        char CourseName[50];
        char StartDate [8], EndDate[8];
        public:
        Course( );
        void Commence( );
        void CDetail( );
};
```
(i) Write the names of member functions, which are accessible from objects of class Course

(ii) Write the names of all data members, which is/are accessible from member function Commence of class Course

(iii) Write the names of all the members, which are accessible from objects of class teacher.

(iv) Which type of inheritance is illustrated in the above C++ code?

Question III

[a]   Write a user defined function in C++ to search a student's record from the given Array of structure using binary search technique. Assume the array is sorted in descending order of the roll number. Assume the following definition: [3]
```
struct Student
{ char name[20];
long rollno;
};
```

[b]   An array X[5] [20] is stored in the memory along the column with each element occupying 4 bytes of memory. Calculate the address of an element X [2] [15] if the element X [3] [10] is stored at the address 2200.   [3]

[c]   Write a function in C++ which accepts an integer array and its size as arguments/parameters and assign the elements into a two dimensional array of integers in the following format (size must be odd)   [2]
If the array is 1 2 3 4 5 . The output must be

1 0 0 0 5
0 2 0 4 0
0 0 3 0 0
0 2 0 4 0
1 0 0 0 5
If the array is 10 15 20. The output must be
10 0 20
 0 15 0
10 0 20

[d]   Write functions in C++ to insert a new node, push( ) and to delete a node, pop( ) containing Book's information, from a dynamically allocated Stack of Books implemented with the help of the following structure.   [4]
```
struct Book
{ int BNo;
char BName[20];
Book *Next;
};
```

[e]   Convert the following expression to postfix expression. Show the contents of the stack at every step.   [2]
(TRUE && FALSE) ||! (FALSE || TRUE)

[f]   Evaluate the following postfix notation of expression: [1]
       10 20 + 25 15 - * 30 /

Question IV

[a]   Considering the text file already contains the following word **"September"** (Double Quotes are not the part of the text.) What will be the output of the following: [1]
       void main ( ) { ofstream fout("NOTES.TXT",ios::app);
       fout<<"Exams ";
       cout.tellp( );
       fout.close( );
       }

[b]   Observe the program segment given below carefully, and answer the question that follows:
       class Candidate
       {
       long CId;
       char CName[20];
       float Marks;
       public:
       void Enter();
       void Display();
       void MarksChange();
       long R_Cid() { return Cid;)
       };
       void MarksUpdate(long Id)
       {
       fstream File;
       File.open("CANDIDAT.DAT",ios::binary|ios::in|ios::out);
       Candidate C;
       int Record=0,Found=0;
       while (!Found && File.read((char *) &C,sizeof(C)))
       {
       if(Id==C.R_Cid())
       {
       cout<<"Enter new Marks";
       C.MarksChange();
       _____ //statement 1
       _____ //statement 2
       Found=1;
       }
       Record++;
       }
       if(Found==1) cout<<"Record Updated";
       File.close();
       }
       Write the statement 1 to position the File Pointer at the beginning of the Record for which the Candidate's Id matches with the argument passed, and Statement 2 to write the updated Record at that position.   [1]

---

[c] Assume that a text file named "FILE.TXT" already contains some text written into it. But while writing into the file, the word, "when" has been misspelled "whn" everywhere in the file. Write a function named **Corrections ( )** in C++ that reads the file "FILE.TXT" and corrects the word "whn". [2]

[d] Given a binary file COMPUTER.DAT, containing records of the following type:

class computer
{ int speed ;
char chipset[20];   //chipset as "PIV" or "QUADCORE or "DUALCORE"
public:
void Enter( );   //Function to enter the details . .
void Show( );   //Function to display the details
int checkchip(char ct[ ])
{return strcmp(Chipset, ct); }
};

i) Write a function copy ( ) that would copy only those records having chipset as "DUALCORE" from "COMPUTER.DAT" to "NOTEBOOK.DAT"

ii) Write a function append ( ) to append new records to the existing file "COMPUTER.DAT". [3]

[e] What is the difference between ios :: app and ios:: ate file modes? [1]

Question V

[a] What do you understand by Selection and Projections in relational algebra ? [1]

[b] What is data independence? How is logical data independence different from physical data independence? [1]

[c] Consider the following tables BOOKINGS and PACKAGE and write SQL commands for (i) to (iv) and outputs for (v) and (vi). [6]

BOOKINGS

Pcode	Tourist Name	Agency	No_of_persons	Tdate
P5	Raghavendra	Voyager	2	23-dec-10
P2	Hardep	Pristine	4	12-jan-11
P5	Shazia	Go Now	6	25-dec-10
P6	Lizza	Pristine	2	28-dec-10
P3	Diana	Voyager	4	19-mar-11
P6	Harshal	Go Now	4	21-mar-11
P1	Rajiv Khanna	Travels	12	12-apr-11
P1	Veena Sethi	Voyager	5	01-apr-11

PACKAGE

Pcode	Pname	Per_Person_amt
P1	Kerala	20000
P2	Malaysia	35000
P3	Goa	56525
P4	Manali	15000
P5	Simla	12000
P6	Singapore	75450

[i] Display the name of all the tourists, their travel dates, names of the places they are traveling to and the total amount to be paid by each tourist.

[ii] Display the name of the agencies from the BOOKING table.

[iii] Arrange the contents of the table BOOKING in ascending order of travel date.

[iv] Display the maximum no_of_persons traveling of each travel agency.

Give output for:-

[v] SELECT Tourist Name, Agency, Pname from BOOKINGS, PACKAGE where BOOKINGS.Pcode = PACKAGES.Pcode and Per_person_amt>3500;

[vi] SELECT Agency, sum(No_of_persons) from BOOKING group by agency having sum(No_of_persons)>10;

Question VI

[a] State and verify De-Morgan's First Theorem in Boolean Algebra, **algebraically.**

[2]

[b] Write the equivalent expression for the following Logic Circuit: [1]
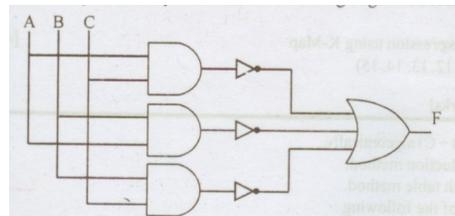
[c] State the dual for the following expression and also draw the logic gate diagram for the dual expression obtained using NOR gate only.
P = A.B + C.D [2]

[d] Simplify the following expression by using the Boolean laws. Show the working in steps and also mention the laws used: [2]
x'.y'.z' + x'.y'.z + x'y.z + x'.y.z' + x.y'.z + x.y'z

[e] A provisional store announces a special discount on all its product as a festival of-fer only to those who satisfy any one of the following conditions:
* If he/she is an employee of the store and has a service of more than 10 years.
* If he/she is a regular customer of the store whose age is less than 65 years and

is not an employee of the store.
* If he/she is a senior citizen but not a regular customer of the store.

The inputs are:
E : Employee of the store
R : Regular customer of the store
S : Service of the employee is more than 10 years
C : Senior citizen of 65 years or above

Output: X-Denotes eligible for discount [1 indicates YES and 0 indicates NO in all cases]

(i) Draw the truth table for the inputs and outputs given above and write the SOP expression for X(E,R,S,C). [2]

(ii) Reduce X(E,R,S,C) using Karnaugh's Map [3]

[f] Reduce the Boolean expression using K-Map: [3]

$F(A,B,C,D)=\pi(0,1,2,4,5,6,8,10)$
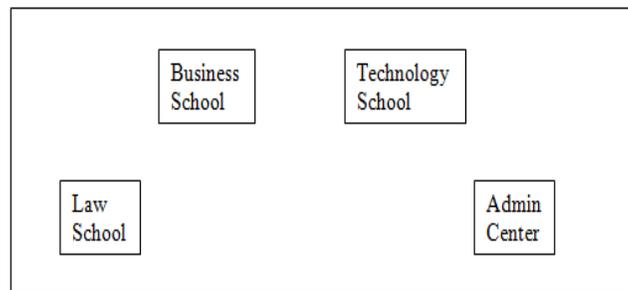
Question VII

[a] In networking, what is WAN? How is it different from LAN? [1]

[b] Differentiate between XML and HTML. [1]

[c] What is WEB2.0? [1]

[d] Out of the following, identify client side script(s) and server side script(s)
(i) JavaScript (ii) ASP (iii) vbscript (iv) JSP [1]

[e] Great Studies University is setting up its Academic school at Sunder Nagar and planning to set up a network. The university has 3 academic schools and one administration center as shown in the diagram bellow: [4]

```
┌─────────────────────────────────────────────┐
│                                               │
│   ┌──────────┐      ┌──────────┐             │
│   │ Business │      │Technology│             │
│   │ School   │      │ School   │             │
│   └──────────┘      └──────────┘             │
│                                               │
│ ┌──────┐                    ┌────────┐       │
│ │ Law  │                    │ Admin  │       │
│ │School│                    │ Center │       │
│ └──────┘                    └────────┘       │
│                                               │
└─────────────────────────────────────────────┘
```

Center to center distances between various blocks

Law school to Business school	60m
Law school to Technology School	90m
Law school to Admin Center	115m
Business school to Technology School	40m
Business school to Admin Center	45m
Technology school to Admin Center	25m

Number of Computers

Law school	25
Technology school	50
Admin center	125
Business school	35

(i)Suggest the most suitable place(i.e school/center) to install the server of this university with a suitable reason.

(ii)Suggest an ideal layout for connecting these school/center for a wired connectivity.

(iii)Which device will you suggest to be placed/installed in each of these school/center to **efficiently** connect all the computers within these school/center.

(iv)The university is planning to connect its admission office in the closest big city, which is more than 350 km from the university. Which type of network out of LAN, MAN or WAN will be formed? Justify your answer.

[f]   Compare Open Source Software and Proprietary Software.   [1]

[g]   What are cookies?   [1]

[h]   Which of the following will come under Cyber Crime?   [1]

(i) Theft of a brand new sealed pack Laptop

(ii) Access to a bank account for getting unauthorized Money Transaction

(iii) Modification in a company data with unauthorized access

(iv) Photocopying a printed report

[i]   What is VoIP?   [1]

[j]   Differentiate between packet switching and message switching techniques in network communication.   [1]

[k]   Differentiate between BUS and STAR topology of networks.   [1]

Question VIII

[a]   Evaluate the output of the following program segment: [1]

```
void main ( )
{
char *p = "Sad";
char c;
c = ++ *p ++;
cout << c;
}
```

[b]   Evaluate the output of the following program segment:

```
void calculate (int A, int &B, int *C)                                    [2]
{ A += B+ ++(*C );
*C = *C * *C;
cout << A <<"\t"<< B <<"\t"<< *C;
}
void main( )
{ int x=40, y=50, z=60;
calculate (x, y, &z);
}
```

[c]   Evaluate the output of the following program segment: [2]

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

[d]   Name the header file(s) that shall be needed for successful compilation of
        the following C++ code :   [1]
        i)   gets( ) ii) gotoxy( ) iii) seekp() iv) setw()

[e]   Write the output of the following code: [2]

```
# include<iostream.h>
# include<ctype.h>
void manipulate( char string[], int & len)
{
for( int i=0; string[i]!='\0';i++)
{
        if (isupper(string[i]))
                string[i]= string[i]-2; len++;
        else
                if (isupper(string[i]))
                        string[i]=string[i+2]; --len;
                else
                        string[i]='@';
}}
void main( )
{ char word[]= "FuN UnliMiTEd!! ";
int length=strlen(word);
manipulate (word, length );
cout<<"Word "<<word<<"@"<<"Length"<<length;
}
```

[f]   Find the output   [3]

```
#include<iostream.h>
void in( int x, int y, int &z)
{ x+=y;
y--;
z*=(x-y);
```

```
}
void out( int z, int y, int &x)
{ x−= y;
y++;
z/=(x+y);
}
void main( )
{
int a= 20, b=30, c=10;
in (a, c, b);
cout<<a<<"#"<<b<<"#"<<c<<"#"<<endl;
out (b, c, a);
cout<<a<<"@"<<b<<"@"<<c<<"@"<<endl;
in (a, b, c);
cout<<a<<"$"<<b<<"$"<<c<<"$"<<endl;
}
```

ЖЖЖЖЖЖЖЖЖЖ

"Success is the sum of small efforts, repeated day in and day out."