#### Model Test Paper-5 **Computer Science(083)** (Solved Paper)

1. (a) Differentiate between a run time error and syntax error. Also give suitable examples of each in C++.

Ans: Run time error: error occurring in a program during its execution. Program execution halts when such a error is encountered.

#### Example :

int A,B,C; cin >>A>>B;

C=A/B;//Run time error if value of b is zero.

#### Svntax error :

Error occurred due to wrong syntax of language deducted by the complier during compilation.

#### **Example :**

cout >>"a c++ program";

(b) Name the header file(s) that shall be needed for successful compilation of the following C++ code

```
void main ()
        char string [20];
        gets (string);
        strcat(String, CBSE);
        puts (string);
```

```
}
```

{

Ans: stdio.h

string.h

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

```
# include <iostream.h>
const int max 10;
void main ()
{
       int Number [max];
Numbers = \{20, 50, 10, 30, 40\};
for (Loc = Max-1; Loc> =0; Loc--)
cout >> Numbers [Loc];
                                    }
```

#### Ans :

#include<iostream.h> const int max  $\pm 10$ ; //OR const int MAX  $\pm 5$ ; void main ()

```
{
       int numbers [max] = \{20, 50, 10, 30, 40\};
       int Loc;
       for (int Loc= max-1;Loc>=0; loc--)
       cout<<<Numbers[Loc];</pre>
       }
(d)
       Find the output of the following program :
       #include<iostream.h>
       void main ()
       {
             int array []={4,6,10,12}
             int *pointer = array;
             For(int I =I; I <3; I++)
             count<< *pointer <<``#``;</pre>
       {
       }
       count<<end1;
       for(I=1 I \leq 4; I++)
       {
               (*pointer) *=3;
       }
       for (I=1; I<5; I++)
          cout<<array[I-1]<<``@``;cout<<end1;</pre>
               4#6#10#
   Ans :
              12@18@30@36@
       Find the output of the following program:
(e)
       #include<iostream.h>
       {
       void withdef(int hisnum; I+=5)
               for (int I=20; I<=hiusnum; I+=5)
       {
                 cout<<I<<``,`` ;
                 cout<<endl;
                                            ł
              void control(int &mynum) ; }
              void main( )
       {
               int yourNum=20;
               control(yourNum);
               withdef();
               cout<<``number=``<<yourNum<<endl;</pre>
   Ans :
              20,25,30,
              20,25,30,
              Number=30
```

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}

(f) In the following C++ program what is the expected value of MyMarks from options(i) to (iv) given below. Justify answer.

```
#include<stdlib.h>
#include<iostream.h>
void main()
{ randomize();
            int Marks[] = { 99, 92, 94, 96, 93, 95}, Mymarks;
            MyMarks= marks[1+random(2)];
            cout<<MyMarks<<endl;
}
(i) 99 (ii) 94
(iii) 96 (iv) None of the above</pre>
```

**Ans.** (ii) 94

2. (a) Differentiate between constructor and destructor function in context of classes and objects using C++

Ans :

#### **Constructor :**

- 1. Name of the constructor functions is same as the name of the class.
- 2. No return type required for constructor functions.
- 3. Constructor functions are called automatically at the time of creation of the object.
- 4. Constructor can be overloaded.
- 5. constructor functions are defined in public.

#### **Destructor :**

- 1. Name of the destructor is same as the name of the class preceded by.
- 2. No return type required for destructor function.
- 3. Destructor functions are called automatically when the scope of the object gets over.
- 4. Destructor can not be overloaded.
- 5. Destructor function is defined in public.
- (b) Answer the questions (i) and (ii) after going through the following class :

```
Marks =10;
cout <<``chapter Intialised ";
}
~Maths () //member Function 2
{
cout<<`` chapter over "
}
;
(i) Name the specific features of class shown by member function1 and member
```

function 2 in above example?

Ans: FUNTION 1: constructor OR default constructor

- (ii) How would Member Function 1 and Member Function 2 get get executed?
  - Ans. Function 1 is executed or invoked automatically when an object of class Maths is created.
     Function 2 is invoked automatically when the scope of an object of class Maths comes to an end.
     OR

Example :

```
{
Maths S1;
.....
}
```

//constructor is invoked //Destructor is invoked

(c) Define a class tour in C++ with the description given below : Private Members:

| TCode                | of type string                 |
|----------------------|--------------------------------|
| Noofadults           | of type integer                |
| Noofkids             | of type integer                |
| Kilometers           | of type integer                |
| Totalfare            | of type float                  |
| Public Members :     |                                |
| A constructor to ass | ign initial values as follows: |

TCode with the word ``null``

```
Noofadults as0
Noof kids as0
```

```
Kilometers as 0
```

TotalFare as 0

• A function assign fare () which calculates and assign

The value of the data member Total Fare as follows For each adult

| Fare (Rs) | For kilometers |
|-----------|----------------|
| 500       | >=1000         |
| 300       | <1000 & >=500  |
| 200       | <500           |

For each Kid the above Fare will be 50% of the fare mentioned in the above table

#### For example:

If Kilometers is 850, Noofadults= 2 and Noofkids=3

Then TotalFare shouls be calculated as

Num of adults\* 300 +Noofkids\*150

i.e. 2\* 300+ 3\* 150 = 1050

- A function entered to () to input the values of the data members TCode, NoofAdults, NoofKids and Kilometers;and invoke the AssignFare() function.
- A function ShowTour() which displays the content of all the data members for a Tour.

#### Ans.

Class tour

```
{
   Char TCode [10]; or char *Tcode;
   int NoofAdults;
   int NoofKids;
   int KILometers;
   float TotalFare;
   public:
   tour()
{
   Strcpy (TCode, ``NULL"): OR TCode [0]=`\0' OR strcpy(TCode, ``\0")
   Noofadults = 0;
 Noof kids = 0;
  Kilometers = 0;
 TotalFare = 0
                            };
Void tour: : assignfare ()
{
if (kilometers>=1000)
   Totalfare =500* Noofadults+250* Noof kids ;
    else if (kilometers>=500)
   Totalfare =300* Noofadults+150*Noofkids;
   else
```

```
Total fare = 200* Noofadults+100*Noofkids;
```

```
}
void tour : : enter ()
ł
 gets (TCode); //or cin >> TCode;
 cin>>Noofadults>>Noofkids>>kilometers;
  Assignfare();
}
  void tour::show tour( )
  {cout<<tcode<<Noofkids<<kilometers <<total fare<<end1;
}
```

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

```
Class trainer
       {char TNo [20], specializations [10];
        int days;
       Protected:
         float remuneration ;void assignrem(float);
       Public:
         Trainer();
               void TEntry( );
               void TDisplay( );
       };
               class Learner
       {
               char Regno[10],LName[20],Program[10];
       protected:
               int Attendance, grade;
       public:
               learner( );
               void TEntry( );
               void TDisplay( );
       };
class institute : public Learner, Public Trainer
       char ICode[10],IName[20];
public:
      Intitute ();
      void Ientry();
      voidIdisplay( );
```

{

};

Which type of inheritance is depicted by the above example? (i)

- Ans : Multiple Inheritance
- (ii) Identify the member function (s) that cannot be called directly from the objects of the class institute from the following

```
Tentry()
LDisplay()
IEntry()
```

Ans : None Or All the above functions can be called.

- (iii) Write the names of all the member(s) accessible from member functions of class Institute.
- Ans. DATA MEMBERS : ICode, IName, Attendance, Grade, Renumeration MEMBER FUNCTIONS : IEntry(), IDisplay(), LEntry(), LDisplay(), AssignRem(), TEntry(), TDisplay()
- (iv) If class Institute was derived privately from class Learner and privately from class Trainer, then name the member function(s) that could be accessed through Objects of Class Institute
- Ans. IEntry(), IDisplay()
  - **3.(a)** Write a function in C++ which accepts an integer array and its size as arguments and replaces elements having odd values with thrice its value and elements having even values with twice its value.
- **Example :** If an array of 5 elements initially contains the elements as 3, 4, 5, 16, 9

then the function should rearrange the content of the array as

```
9, 8, 15, 32, 27
```

```
Ans. void replace(int Arr[], int size)
```

```
{
  for (int i=0; i<size; i++)
  if(Arr[i] % 2 != 0)
  Arr[i] * = 3;
  else
  Arr[i] * = 2;
}</pre>
```

- (b) An array Array[20][15] is stored in the memory along the column with each element occupying 8 bytes. Find out the base address and address of the element Array[2][3] if the element Array[4][5] is stored at the address 1000.
- Ans. Address of Array[i][j] along the column = Base Address +W[(i-L1) + (j-L2) \*M] Where W = size of each location in bytes = 8 L1 = Lower Bound of rows =0 L2 = Lower Bound of rows = 0

M = Number of rows per column = 20Address of Array[4][5] = Base Address + 8[(4-0)+ (5-0) \* 20] 1000 = Base Address + 8[104] Base Address =1000-8\*104 =1000 - 832 = 168 Address of Arrays[2][3] = 168 + 8 [(2-0) + ( 3-0) \* 20] = 168 + 8\* 62 = 168 + 496 = 664

Write a function in c++ to delete a node containing Book's information from a dynamically allocated stack of Books implemented with the help of the following structure

```
struct Book
        {
         int Bno;
         char Bname[20];
         Book *Next;
          };
       Class stack
Ans.
        {
          public:
          book()
        {
          top=NULL; }
          void Push ( );
          void Pop( );
          void Display( );
          ~Book();
        };
          void stack :: Pop()
        {
               if (top != NULL)
        {
               stack *temp;
               temp =Top;
               cout \ll Top \rightarrow Bno \ll Top \rightarrow "deleted" \ll endl;
               Top= Top \rightarrow Next ;
               delete Temp;
        }
               Else
               cout << "stock Emplty";
          }
```

(d) Write a function in c++ which accepts a 2D array of integers and its size as arguments and displays the elements which lie on diagonals.

[Assuming the 2D Array to be square matrix with odd dimension ie. 3X3, 5X5, 7X7 etc...]

**Example,** if the array content is

5 4 3 7 6 8 2 9 1 Output through the function should be : Diagonal One : 5 7 9 3 7 Diagonal two : 1

Ans. void Diagonals(int Arr[][100], int size)
{ int Row, Col;
 cout<<"Diagonal One : ";
 for(Row =0;Row<Size;Row++)
 for(Col=0;Col<Size;Col++)
 if(Row = = Col)
 cout<<Arr[Row][Col];
 cout<<"Diagonal Two : ";
 for(Row =0;Row<Size;Row++)
 for(Col=0;Col<Size;Col++)
 if(Row + Col = = Size -1)
 cout<<Arr[Row][Col];
 }
}</pre>

| (e) | Eval | uate tl | ie follo | wing po | ostfix no | otation | of expr | ession: |
|-----|------|---------|----------|---------|-----------|---------|---------|---------|
|     | 25   | 8       | 3        | -       | 1         | 6       | *       | 10      |

Ans.

| <b>Operator Scanned</b> | Stack Content |
|-------------------------|---------------|
| 25                      | 25            |
| 8                       | 25, 8         |
| 3                       | 25, 8, 3      |
| -                       | 25, 5         |
| /                       | 5             |
| 6                       | 5, 6          |
| *                       | 30            |
| 10                      | 30, 10        |
| +                       | 40            |

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

+

class PracFile

{ int Pracno; char PracName[20]; int TimeTaken; int Marks;

public:

```
//function to enter PracFile details
       void EnterPrac( );
       //function to display PracFile details
       void ShowPrac( );
       //function to return Time taken
       int RTime( ) { return TimeTaken;}
       //function to assign Marks
       void Assignmarks(int M)
       {
       Marks = M;
       };
void AllocateMarks( )
       fstream File;
{
       File.open("Marks.Dat.,ios::binary|ios:in|ios:out);
       PracFile P;
       int Record = 0;
       while(File.read((char *)&P, sizeof(P)))
{
       if (P.RTime() > 50)
       P.Assignment(0)
       else
       P.Assignment(10)
                                  //statement 1
                                   //statement 2
       Record++;
}
       File.Close();
  }
```

If the function Allocate Marks() is supposed to allocate Marks for the records in the file MARKS.DAT based on their value of the member TimeTaken. Write C++ statements for the statement1 and statement2, where statement1 is required to position the file write pointer to an appropriate place in the file and statement2 is to perform the write operation with the modified record.

Ans.

```
Statement 1 :
```

```
File.seekp(Record * sizeof(P));
Or
File.seekp(Record * sizeof(PracFile));
Or
File.seekg(Record * sizeof(P));
```

Statement 2 :

```
File.write((char *)&P, sizeof(P));
```

Or File.write((char \*)&P, sizeof(PracFile));

(b) Write a function in C++ to print the count of the word is as an independent word in a text file DIALOGUE.TXT.

For example, if the content of the file DIALOGUE.TXT is This is his book. Is this book good? Then the output of the program should be 2.

```
Ans. void countis()
```

```
{ ifstream Fil;
 Fil.open("Dialogue.txt");
 char Word[50];
 int Count=0;
 while (!Fil.eof())
 { Fil>>Word;
 if(strcmpi(Word,"is")==0)
 count++;
}
cout<<count;
Fil.close();
}
```

(c) Given a binary file GAME.DAT, containing records of the following structure type struct Game

{

char GameName[20]; char Participant[10][30];

};

Write a function in C++ that would read the contents from the file GAME.DAT and creates a file named BASKET.DAT copying only those records from GAME.DAT where the game name is "Basket Ball"

Ans: void CopyBasket()

{ Game G; ifstream fin; fin.open("GAME.DAT",ios::binary); ofstream fout; fout.open("BASKET.DAT",ios::binary); while(fin.read((char \*)&G, Sizeof(G))) { if(strcmp(G.GameName,"Basket Ball")==0) fout.write((char \*)&G, sizeof(G)); }

fin.close( );
fout.close( );

}

#### **5.** (a) Differentiate between the terms primary key and alternate key.

- Ans. All candidate keys, which are not the primary key of the table are called alternate keys.
- (b) Consider the following tables Consignor, Consignee and Consignment. Write SQL commands for the statements (i) to (iv) and give the outputs for SQL queries (v) to (viii).

| Sender   |            |                   | - Comment |
|----------|------------|-------------------|-----------|
| SenderID | SenderName | SenderAddress     | City      |
| ND01     | R Jain     | 2, ABC Appts      | New Delhi |
| MU02     | H Sinha    | 12, Newtown       | Mumbai    |
| MU15     | S Jha      | 27/A, Park Street | Mumbai    |
| ND50     | T Prasad   | 122 - K, SDA      | New Delhi |

| Recipient |          |            |                       |           |  |  |  |
|-----------|----------|------------|-----------------------|-----------|--|--|--|
| RecID     | SenderID | RecName    | RecAddress            | RecCity   |  |  |  |
| KO05      | ND01     | R Bajpayee | 5, Central Avenue     | Kolkata   |  |  |  |
| ND08      | MU02     | S Mahajan  | 116, A Vihar          | New Delhi |  |  |  |
| MU19      | ND01     | H Singh    | 2A, Andheri East      | Mumbai    |  |  |  |
| MU32      | MU15     | P K Swamy  | B5, C S Terminus      | Mumbai    |  |  |  |
| ND48      | ND50     | S Tripathi | 13, BI D, Mayur Vihar | New Delhi |  |  |  |

#### (i) To display the names of all Senders from Mumbai

**Ans.** SELECT sendername from Sender where sendercity='Mumbai';

- (ii) To display the RecIC, Sendername, SenderAddress, RecName, RecAddress for every Recipient.
  - Ans. Select R.RecIC, S.Sendername, S.SenderAddress, R.RecName, R.RecAddress from Sender S, Recepient R where S.SenderID=R.SenderID;
- (iii) To display Recipient details in ascending order of RecName Ans. SELECT \* from Recipient ORDER By RecName;
- (iv) To display number of Recipients from each cityAns. SELECT COUNT(\*) from Recipient Group By RecCity;

#### (v) SELECT DISTINCT SenderCity from Sender;

Ans. <u>SenderCity</u> Mumbai New Delhi

| (vi) | SELECT A.Sende | erName, B.RecName                             |
|------|----------------|---|
|      | From Sende     | er A, Recipient B                             |
|      | Where A.S.     | enderID = B.SenderID AND B.RecCity ='Mumbai'; |
| Ans. | A.SenderName   | <b>B.RecName</b>                              |
|      | R Jain         | H Singh                                       |

P K Swamy

| (vii)  | SELECT RecName, Rec.<br>From Recipient<br>Where RecCity NO | Address   |
|--------|--|---|
| Ans.   | <u>RecName</u><br>S Mahajan<br>S Tripathi                  | <u>RecAddress</u><br>116, A Vihar<br>13, BID, Mayur Vihar |
| (viii) | SELECT RecID, RecNar<br>FROM Recipent<br>Where SenderID=   | ne<br>'MU02' or SenderID='ND50';                          |

| Ans. | <u>RecID</u> | <u>RecName</u> |  |
|------|--------------|----------------|--|
|      | ND08         | S Mahajan      |  |
|      | ND48         | S Tripathi     |  |
|      |              |                |  |

6.(a) State Distributive law and verify the same using truth table.

**Ans.** If X, Y, Z are Boolean Variables then

S Jha

X.(Y + Z) = X.Y + X.Z or X+Y.Z = (X+Y).(X+Z)

| Χ | Y | Ζ | Y+Z | X.(Y+Z) | X.Y | X.Z | X.Y+X.Z |
|---|---|---|-----|---------|-----|-----|---------|
| 0 | 0 | 0 | 0   | 0       | 0   | 0   | 0       |
| 0 | 0 | 1 | 1   | 0       | 0   | 0   | 0       |
| 0 | 1 | 0 | 1   | 0       | 0   | 0   | 0       |
| 0 | 1 | 1 | 1   | 0       | 0   | 0   | 0       |
| 1 | 0 | 0 | 0   | 0       | 0   | 0   | 0       |
| 1 | 0 | 1 | 1   | 1       | 0   | 1   | 1       |
| 1 | 1 | 0 | 1   | 1       | 1   | 0   | 1       |
| 1 | 1 | 1 | 1   | 1       | 1   | 1   | 1       |

(b) Write the equivalent Canonical Sum of Product expression for the following Product of Sum Expression

**Ans.**  $F(X, Y, Z) = \prod (1, 3, 6, 7)$  $F(X, Y, Z) = \sum (0, 2, 4, 5)$ = X'. Y'. Z' + X'.Y.Z' + X.Y'.Z' + X.Y'.Z

(c) Write the equivalent Boolean Expression for the following Logic circuit.



Ans:



F = W.X' + Y'.Z

# (d) Reduce the following Boolean expression using K-Map $F(U,V,W,Z) = \sum (0, 1, 2, 3, 4, 10, 11)$

Ans.

Ans.



F= U'.V' + W.V' + U'.W'.Z'

- 7.(a) What is the significance of Cyberlaw?
- **Ans.** Cyberlaw helps prevent Cyber Crime, Hacking, Data Theft, Software Piracy and protects rights of Cyber Users.
- (b) Expand the following terms with respect to networking :

| (i) CDMA  | (ii) FTP  |
|-----------|-----------|
| (iii) WLL | (iv) HTML |

- Ans. (i) Code Division Multiple Access
  - (ii) Wireless Local Loop
  - (iii) File Transfer Protocol
  - (iv) Hypertext Markup Language
- (c) Which of the following unit measures the speed with which data can be transmitted from one node to another node of a network? Also, give the expansion of the suggested unit.

(i) Mbps (ii) KMph (iii) MGps Mbps(Mega Bits Per Second)

(d) "Bhartiya Connectivity Association" is planning to spread their offices in four major cities in India to provide regional IT infrastructure support in the field of Education & Culture . The company has planned to setup their head office in New Delhi in three locations and have named their New Delhi offices as "Front office", "Back Office" and "Work Office". The company has three more regional offices as "South Office", "East Office" and "West Office" located in other three major cities of India. A rough layout of the same as follows :



Approximate distances between these offices as per network survey team is as follows :

| Place Form  | Place To     | Distance |
|-------------|--------------|----------|
| Back Office | Front Office | 10km     |
| Back Office | Work Office  | 70 Meter |
| Back Office | East Office  | 1291km   |
| Back Office | West Office  | 790 km   |
| Back Office | South Office | 1952 km  |

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

| Front Office | 100 |
|--------------|-----|
| Work Office  | 20  |
| East Office  | 50  |
| West Office  | 50  |
| South Office | 50  |
| Front Office | 50  |

(1) Suggest network types (out of LAN, MAN, WAN) for connecting each of the following set of their offices :

- Back Office and Work Office
- Back Office and South Office

Ans. Back Office and Work Office -LAN

Back Office and South Office - WAN

- (2) Which device you will suggest to be procured by the company for connecting all the computers with in each of their offices out of the following devices?
  - Switch/Hub
  - Modem
  - Telephone

- Ans. Switch / Hub
- (3) Which of the following communication medium, you will suggest to be procured by the company for connecting their local offices in New Delhi for every effective and fast communication?
  - Telephone Cable
  - Optical Fiber
  - Ethernet Cable
- Ans. Optical Fiber
- (4) Suggest a cable/wiring layout for connecting the company's local offices located in New Delhi. Also, suggest an effective method/technology for connecting the company's regional offices "East Office", "West Office" and "South Office" with Offices located in New Delhi.

Ans.



Optical Fiber / Star Topology/ Radiowave etc.