Roll No. | | | | | | | |

Series SSR **Code No. 91**

- Please check that this question paper contains 11 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 7 questions.
- Please write down the serial number of the question before attempting it.

COMPUTER SCIENCE

Time allowed : 3 hours *Maximum Marks : 70*

Instructions :

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

(ii) *Programming Language : C++*

1. (a) What is the purpose of using a typedef command in C++. Explain with suitable example. 2

(b) Name the header files that shall be needed for the following code : 1

```
void main()
{
      char Word[]="Exam";
      cout<<setw(20)<<Word;
}
```

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

```
#include <iostream.h>
void main()
{
      One = 10, Two = 20;
      Callme(One;Two);
      Callme(Two);
}
void Callme(int Arg1, int Arg2=20)
{
      Arg1 = Arg1 + Arg2;
      cout<<Arg1 >> Arg2;
}
```

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

```
#include<iostream.h>
#include<ctype.h>
void main()
{
      char Mystring[]="What@OUTPUT!";
      for(int I = 0; Mystring[I]!='\0'; I++)
      {
            if(!isalpha(Mystring[I]))
                  Mystring[I] = '*';
            else if (isupper(Mystring[I]))
                  Mystring[I] = Mystring[I]+1;
            else
                  Mystring[I] = Mystring[I+1];
      }
      cout<<Mystring;
}
```

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

```
#include<iostream.h>
void main()
{
    int A=5, B=10;
    for(int I = 1; I<=2; I++)
    {
      cout<<"Line1="<<A++<<"&"<<B-2<<endl;
      cout<<"Line2="<<++B<<"&"<<A+3<<endl;
    }
}
```

(f) In the following program, find the correct possible output(s) from the options : 2

```
#include<stdlib.h>
#include<iostream.h>
void main()
{
      randomize();
      char Area[][10]={"NORTH","SOUTH","EAST","WEST"};
      int ToGo;
      for (int I=0;I<3;I++)
      {
            ToGo=random(2)+1;
            cout<<Area[ToGo]<<":";
      }
}
```

outputs :

(i) **SOUTH:EAST:SOUTH:**

(ii) **NORTH:SOUTH:EAST:**

(iii) **SOUTH:EAST:WEST:**

(iv) **SOUTH:EAST:EAST:**

2. (a) Differentiate between **private** and **protected** visibility modes in context of Object Oriented Programming giving a suitable example illustrating each. 2

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

```
#include<iostream.h>
#include<string.h>
class Retail
{
      char Category[20];
      char Item[20];
      int Qty;
      float Price;
      Retail()                              //Function 1
      {
            strcpy(Category, "Cereal");
            strcpy(Item, "Rice");
            Qty=100;
            Price=25;
      }
public:
    void Show()                             //Function 2
    {
            cout<<Category<<"-"<<Item<<":"<<Qty
                <<"@"<<Price<<endl;
    }
};
void main()
{
    Retail R;                               //Statement 1
    R.Show();                               //Statement 2
}
```

(i) Will Statement 1 initialize all the data members for object R with the values given in the Function 1 ? (Yes OR No). Justify your answer suggesting the correction(s) to be made in the above code.

(ii) What shall be the possible output when the program gets executed ? (Assuming, if required – the suggested correction(s) are made in the program)

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

Private Members :

Code	of type string
Type	of type string
Size	of type integer
Material	of type string
Price	of type float

A function Calc_Price( ) which calculates and assigns the value of Price as follows :

For the value of Material as "COTTON" :

Type	Price (Rs.)
TROUSER	1500
SHIRT	1200

For Material other than "COTTON" the above mentioned Price gets reduced by 25%.

Public Members :

A constructor to assign initial values of Code, Type and Material with the word "NOT ASSIGNED" and Size and Price with 0.

A function Enter( ) to input the values of the data members Code, Type, Size and Material and invoke the CalcPrice( ) function.

A function Show( ) which displays the content of all the data members for a Clothing.

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

```
class Toys
{
        char TCode[5];
protected:
        float Price;
        void Assign(float);
public:
        Toys();
        void TEntry();
        void TDisplay();
};
class SoftToys: public Toys
{
        char STName[20];
        float Weight;
public:
        SoftToys();
        void STEntry();
        void STDisplay();
};
class ElectronicToys: public Toys
{
        char ETName[20];
        int No_of_Batteries;
public:
        ElectronicToys();
        void ETEntry();
        void ETDisplay();
};
```

(i) Which type of Inheritance is shown in the above example ?

(ii) How many bytes will be required by an object of the class SoftToys ?

(iii) Write name of all the data members accessible from member functions of the class SoftToys.

(iv) Write name of all the member functions, which are accessible from an object of the class ElectronicToys.

3. (a) Write a function in C++, which accepts an integer array and its size as arguments and swaps the elements of every even location with its following odd location. 4

Example : if an array of nine elements initially contains the elements as

2, 4, 1, 6, 5, 7, 9, 23, 10

then the function should rearrange the array as

4, 2, 6, 1, 7, 5, 23, 9, 10

(b) An array Arr[50][100] is stored in the memory along the row with each element occupying 2 bytes. Find out the address of the location Arr[20][50], if the location Arr[10][25] is stored at the address 10000. 4

(c) Write a function in C++ to Delete an element from a dynamically allocated Queue where each node contains a real number as data. 4

Assume the following definition of MYNODE for the same.

```
struct MYNODE
{
        float NUM;
        MYNODE *Link;
};
```

(d) Write a function in C++ to print the product of each row of a two dimensional integer array passed as the argument of the function. 2

Example : if the two dimensional array contains

20	40	10
40	50	30
60	30	20
40	20	30

Then the output should appear as :

Product of Row 1= 8000

Product of Row 2= 6000

Product of Row 3= 3600

Product of Row 4= 2400

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

```
5, 20, 15, -, *, 25, 2, *, +
```

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

```
class Candidate
{
    long CId;                   //Candidate's Id
    char CName[20];             //Candidate's Name
    float Marks;                //Candidate's Marks
public :
    void Enter();
    void Display();
    void MarksChange();        //Function to change marks
    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

(b) Write a function in C++ to count the number of uppercase alphabets present in a text file "ARTICLE.TXT". 2

(c) Given a binary file TELEPHON.DAT, containing records of the following class Directory :

```
class Directory
{
        char Name[20];
        char Address[30];
        char AreaCode[5];
        char Phone_No[15];
public:
        void Register();
        void Show();
        int CheckCode(char AC[])
        {
                return strcmp(AreaCode,AC);
        }
};
```

Write a function COPYABC( ) in C++, that would copy only those records having AreaCode as "123" from TELEPHON.DAT to TELEBACK.DAT. 3

5. (a) Differentiate between **Candidate Key** and **Alternate Key** in context of RDBMS. 2

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

TABLE : ITEM

I_ID	ItemName	Manufacturer	Price
PC01	Personal Computer	ABC	35000
LC05	Laptop	ABC	55000
PC03	Personal Computer	XYZ	32000
PC06	Personal Computer	COMP	37000
LC03	Laptop	PQR	57000

TABLE : CUSTOMER

C_ID	CustomerName	City	I_Id
01	N Roy	Delhi	LC03
06	H Singh	Mumbai	PC03
12	R Pandey	Delhi	PC06
15	C Sharma	Delhi	LC03
16	K Agarwal	Bangalore	PC01

(i) To display the details of those Customers whose City is Delhi

(ii) To display the details of Items whose Price is in the range of 35000 to 55000 (Both values included)

(iii) To display the CustomerName, City from table Customer and ItemName and Price from table Item, with their corresponding matching I_Id

(iv) To increase the Price of all Items by 1000 in the table Item

(v) SELECT DISTINCT City FROM Customer;

(vi) SELECT ItemName, MAX(Price), Count(*)
FROM Item GROUP BY ItemName;

(vii) SELECT CustomerName, Manufacturer
FROM Item, Customer
WHERE Item.Item_Id=Customer.Item.I_Id

(viii) SELECT ItemName, Price * 100
FROM Item WHERE Manufacturer='ABC';

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

(b) Draw a Logical Circuit Diagram for the following Boolean Expression : 1

$A \cdot (B + C')$

(c) Convert the following Boolean expression into its equivalent Canonical Product of Sum Form(POS) : 2

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

(d) Reduce the following Boolean expression using K – Map : 3

$F(A,B,C,D) = \Sigma(0,1,2,4,5,8,9,10,11)$

7. (a) What is a Modem ? 1

(b) Expand the following terms with respect to Networking : 2

(i) PPP

(ii) GSM

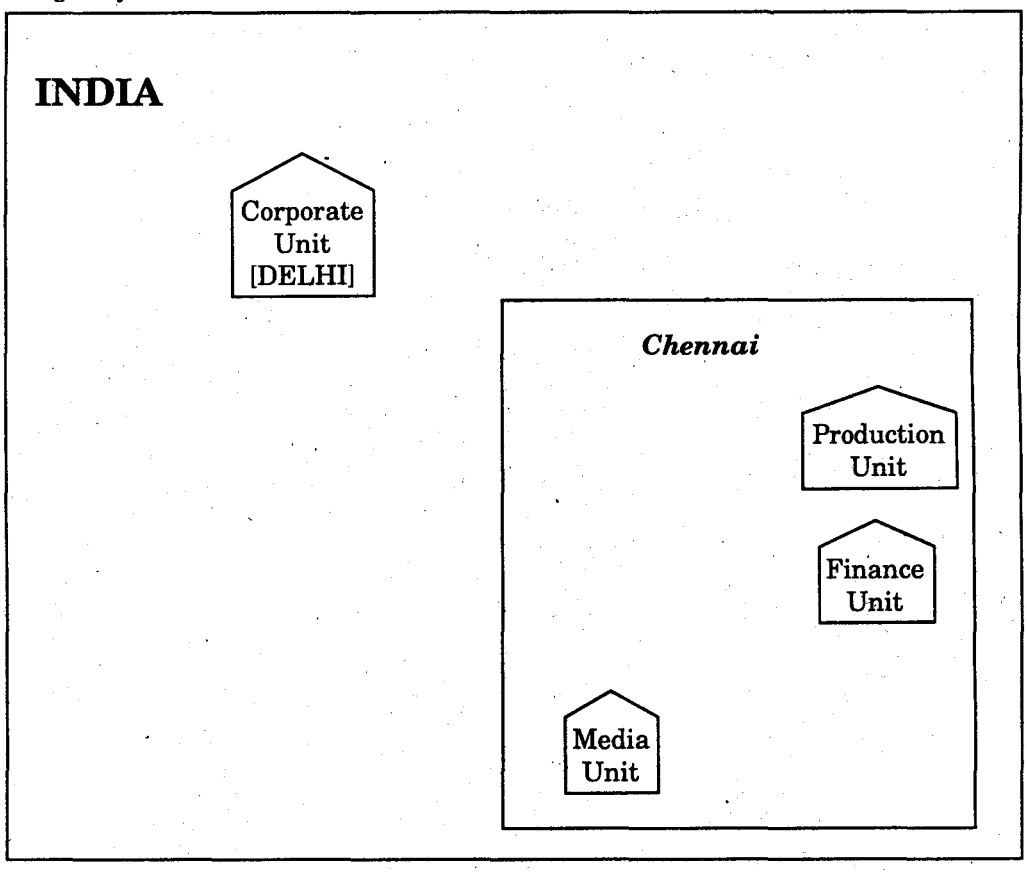
(iii) XML

(iv) HTTP

(c) How is a Hacker different from a Cracker ? 1

(d) "China Middleton Fashion" is planning to expand their network in India, starting with two cities in India to provide infrastructure for distribution of their product. The company has planned to set up their main office units in Chennai at three different locations and have named their offices as "Production Unit", "Finance Unit" and "Media Unit". The company has its corporate unit in Delhi.

A rough layout of the same is as follows :



Approximate distances between these Units is as follows.:

From	To	Distance
Production Unit	Finance Unit	70 Mtr
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 (out of LAN, MAN, WAN) for connecting each of the following office units :

- Production Unit and Media Unit
- 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 office units in Chennai for very effective (High Speed) communication ?

- Telephone Cable
- Optical Fiber
- Ethernet 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 the company's office unit located in Delhi. 4