**Series SMA**

**Code No. 91**

Candidates must write the Code on the title page of the answer-book.

Roll No. | | | | | | | |

- Please check that this question paper contains **15** 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.**
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

# COMPUTER SCIENCE

*Time allowed : 3 hours* *Maximum Marks : 70*

***Instructions :***

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

*(ii)* *Programming Language : C++*

**1.** (a) Give the difference between the type casting and automatic type conversion. Also, give a suitable C++ code to illustrate both. *2*

(b) Which C++ header file(s) are essentially required to be included to run/execute the following C++ source code (Note : Do not include any header file, which is/are not required) : *1*

```
void main()
{
 char TEXT[]="SomeThing";
 cout<<"Remaining SMS Chars :"<<160-strlen(TEXT)<<endl;
}
```

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

```
#include <iostream.h>
Class Item
{
   long IId,Qty;
public:
   void Purchase{cin>>IId>>Qty;}
   void Sale()
   {
      cout<<setw(5)<<IId<<" Old:"<<Qty<<endl;
      cout<<"New:"<<--Qty<<endl;
   }
};
void main()
{
   Item I;
   Purchase();
   I.Sale();
   I.Sale()
}
```

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

```
#include <iostream.h>
class METRO
{
   int Mno,TripNo,PassengerCount;
public:
  METRO(int Tmno=1) {Mno=Tmno;TripNo=0;PassengerCount=0;}
  void Trip(int PC=20){TripNo++;PassengerCount+=PC;}
  void StatusShow(){cout<<Mno<<":"<<TripNo<<":"
                                  <<PassengerCount<<endl;}
};
```

```
void main()
{
   METRO M(5),T;
   M.Trip();
   T.Trip(50);
   M.StatusShow();
   M.Trip(30);
   T.StatusShow();
   M.StatusShow();
}
```

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

```
#include <iostream.h>
#include <ctype.h>
typedef char Str80[80];
void main()
{
   char *Notes;
   Str80 Str="vR2GooD";
   int L=6;
   Notes=Str;
   while (L>=3)
   {
      Str[L]=(isupper(Str[L])?tolower(Str[L]):
                                        toupper(Str[L]));
      cout<<Notes<<endl;
      L--;
      Notes++;
   }
}
```

(f) Observe the following program and find out, which output(s) out of (i) to (iv) will ***not*** be expected from the program ? What will be the minimum and the maximum value assigned to the variable Chance ? 2

```
#include <iostream.h>
#include <stdlib.h>
void main()
{
   randomize();
   int Arr[]={9,6},N;
   int Chance=random(2)+10;
   for (int C=0;C<2;C++)
   {
      N=random(2);
      cout<<Arr[N]+Chance<<"#";
   }
}
```

(i) 9#6#

(ii) 19#17#

(iii) 19#16#

(iv) 20#16#

**2.** (a) What is the difference between the members in private visibility mode and the members in protected visibility mode inside a class ? Also, give a suitable C++ code to illustrate both. 2

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

```
class Travel
{
   int PlaceCode;char Place[20];float Charges;
public:
   Travel()                                  //Function 1
   {
      PlaceCode=1;strcpy(Place,"DELHI");Charges=1000;
   }
   void TravelPlan(float C)                  //Function 2
   {
      cout<<PlaceCode<<":"<<Place<<":"<<Charges<<endl;
   }
   ~Travel()                                 //Function 3
   {
      cout<<"Travel Plan Cancelled"<<endl;
   }
   Travel(int PC,char P[],float C)           //Function 4
   {
      PlaceCode=PC;strcpy(Place,P);Charges=C;
   }
};
```

(i) In Object Oriented Programming, what are **Function 1** and **Function 4** combined together referred as ?

(ii) In Object Oriented Programming, which concept is illustrated by **Function 3** ? When is this function called/invoked ?

(c) Define a class RESTRA in C++ with following description : 4

Private Members

- FoodCode of type int
- Food of type string
- FType of type string
- Sticker of type string
- A member function GetSticker() to assign the following values for Sticker as per the given FType :

| FType | Sticker |
|---|---|
| Vegetarian | GREEN |
| Contains Egg | YELLOW |
| Non-Vegetarian | RED |

Public Members

- A function GetFood() to allow user to enter values for FoodCode, Food, FType and call function GetSticker() to assign Sticker.
- A function ShowFood() to allow user to view the content of all the data members.

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

```
class COMPANY
{
   char Location[20];
   double Budget,Income;
protected:
   void Accounts();
public:
   COMPANY();
   void Register();
   void Show();
};
class FACTORY:public COMPANY
{
   char Location[20];
   int Workers;
protected:
   double Salary;
   void Computer();
public:
   FACTORY();
   void Enter();
   void Show();
};
class SHOP: private COMPANY
{
   char Location[20];
   float Area;
   double Sale;
public:
   SHOP();
   void Input();
   void Output();
};
```

(i) Name the type of inheritance illustrated in the above C++ code.

(ii) Write the name of data members, which are accessible from member functions of class SHOP.

(iii) Write the names of all the member functions, which are accessible from objects belonging to class FACTORY.

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

**3.** (a) Write a function SWAP2BEST (int ARR[], int Size) in C++ to modify the content of the array in such a way that the elements, which are multiples of 10 swap with the value present in the very next position in the array. *3*

For example :

If the content of array ARR is

```
90, 56, 45, 20, 34, 54
```

The content of array ARR should become

```
56, 90, 45, 34, 20, 54
```

(b) An array T[20][10] is stored in the memory along the column with each of the elements occupying 2 bytes. Find out the memory location of T[10][5], if the element T[2][9] is stored at the location 7600. *3*

(c) Write a function in C++ to perform Insert operation in a static circular Queue containing Book's information (represented with the help of an array of structure BOOK). *4*

```
struct BOOK
{
    long Accno;              //Book Accession Number
    char Title[20];          //Book Title
};
```

(d) Write a function ALTERNATE (int A[][3], int N, int M) in C++ to display all alternate elements from two-dimensional array A (starting from A[0][0]). *2*

For example :

If the array is containing :

```
23   54   76
37   19   28
62   13   19
```

The output will be

```
23 76 19 62 19
```

(e) Evaluate the following POSTFIX notation. Show status of Stack after every step of evaluation (i.e. after each operator) : *2*

```
True,False,NOT,AND,False,True,OR,AND
```

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

```
class Stock
{
   int Ino,Qty; char Item[20];
public:
   void Enter(){cin>>Ino;gets(Item); cin>>Qty;}
   void Issue(int Q){Qty+=Q;}
   void Purchase(int Q){Qty-=Q;)
   int GetIno(){return Ino;}
};
void PurchaseItem(int Pino,int PQty)
{
   fstream File;
   File.open("STOCK.DAT",ios::binary|ios::in|ios::out);
   Stock S;
   int Success=0;
```

```
while (Success==0 && File.read((char*)&S,sizeof(S)))
{
     if (Pino==S.GetIno())
     {
        S.Purchase(PQty);
        _____________________          //Statement 1
        _____________________          //Statement 2
        Success++;
     }
}
if (Success==1)
    cout<<"Purchase Updated"<<endl;
    else
      cout<<"Wrong Item No"<<endl;
    File.close();
}
```

(i) Write statement 1 to position the file pointer to the appropriate place, so that the data updation is done for the required item.

(ii) Write statement 2 to perform the write operation so that the updation is done in the binary file.

(b) Write a function in C++ to read the content of a text file "DELHI.TXT" and display all those lines on screen, which are either starting with 'D' or starting with 'M'. *2*

(c) Write a function in C++ to search for the details (Phoneno and Calls) of those Phones, which have more than 800 calls from a binary file "phones.dat". Assuming that this binary file contains records/objects of class Phone, which is defined below. *3*

```
class Phone
{
   char Phoneno[10];int Calls;
public:
   void Get(){gets(Phoneno); cin>>Calls;}
   void Billing(){cout<<Phoneno<<"#"<<Calls<<endl;}
   int GetCalls(){return Calls;}
};
```

**5.** (a) Give a suitable example of a table with sample data and illustrate Primary and Alternate Keys in it. *2*

Consider the following tables CARDEN and CUSTOMER and answer (b) and (c) parts of this question :

Table : CARDEN

| Ccode | CarName | Make | Color | Capacity | Charges |
|---|---|---|---|---|---|
| 501 | A-Star | Suzuki | RED | 3 | 14 |
| 503 | Indigo | Tata | SILVER | 3 | 12 |
| 502 | Innova | Toyota | WHITE | 7 | 15 |
| 509 | SX4 | Suzuki | SILVER | 4 | 14 |
| 510 | C Class | Mercedes | RED | 4 | 35 |

Table : CUSTOMER

| CCode | Cname | Ccode |
|---|---|---|
| 1001 | Hemant Sahu | 501 |
| 1002 | Raj Lal | 509 |
| 1003 | Feroza Shah | 503 |
| 1004 | Ketan Dhal | 502 |

(b) Write SQL commands for the following statements : 4

(i) To display the names of all the silver colored Cars.

(ii) To display name of car, make and capacity of cars in descending order of their sitting capacity.

(iii) To display the highest charges at which a vehicle can be hired from CARDEN.

(iv) To display the customer name and the corresponding name of the cars hired by them.

(c) Give the output of the following SQL queries : 2

(i) SELECT COUNT(DISTINCT Make) FROM CARDEN;

(ii) SELECT MAX(Charges),MIN(Charges) FROM CARDEN;

(iii) SELECT COUNT(*), Make FROM CARDEN;

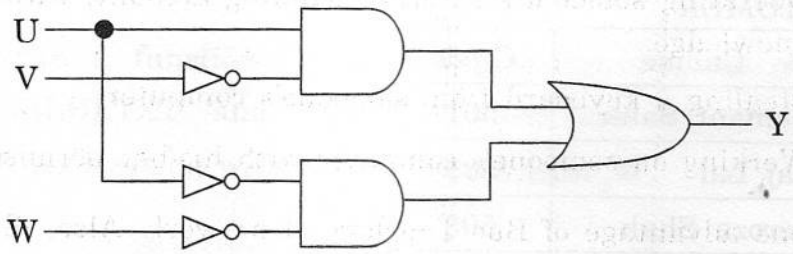
(iv) SELECT CarName FROM CARDEN WHERE Capacity=4;

**6.** (a) Verify the following using truth table : 2

(i) X.X′=0

(ii) X+1=1

(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 in a truth table as follows : *1*

| X | Y | Z | F |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 |

(d) Reduce the following Boolean Expression using K-Map : *3*

$F(A,B,C,D) = \Sigma(2,3,4,5,6,7,8,10,11)$

**7.** (a) What out of the following, will you use to have an audio-visual chat with an expert sitting in a far-away place to fix-up a technical issue ? *1*

(i) VoIP

(ii) email

(iii) FTP

(b) Name one server side scripting language and one client side scripting language. *1*

(c) Which out of the following comes under Cyber Crime ? *1*

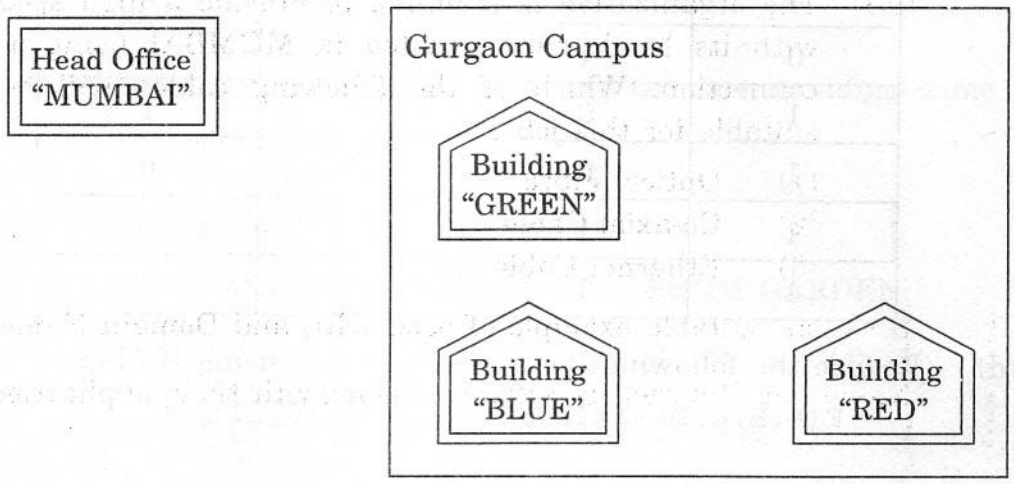
(i) Operating someone's Internet banking account, without his knowledge.

(ii) Stealing a keyboard from someone's computer.

(iii) Working on someone's computer with his/her permission.

(d) Write one advantage of Bus Topology of network. Also, illustrate how 4 computers can be connected with each other using star topology of network. *1*

(e) Workalot Consultants are setting up a secured network for their office campus at Gurgaon for their day-to-day office and web-based activities. They are planning to have connectivity between 3 buildings and the head office situated in Mumbai. Answer the questions (i) to (iv) after going through the building positions in the campus and other details, which are given below : 4




**Distances between various buildings**

| | |
|---|---|
| Building "GREEN" to Building "RED" | 110 m |
| Building "GREEN" to Building "BLUE" | 45 m |
| Building "BLUE" to Building "RED" | 65 m |
| Gurgaon Campus to Head Office | 1760 KM |

**Number of Computers**

| | |
|---|---|
| Building "GREEN" | 32 |
| Building "RED" | 150 |
| Building "BLUE" | 45 |
| Head Office | 10 |

(i) Suggest the most suitable place (i.e. building) to house the server of this organization. Also give a reason to justify your suggested location.

(ii) Suggest a cable layout of connections between the buildings inside the campus.

(iii) Suggest the placement of the following devices with justification :

(1) Switch

(2) Repeater

(iv) The organization is planning to provide a high speed link with its head office situated in MUMBAI using a wired connection. Which of the following cables will be most suitable for this job ?

(1) Optical Fibre

(2) Co-axial Cable

(3) Ethernet Cable

(f) Give one suitable example of each URL and Domain Name. *1*

(g) Name two Proprietary softwares alongwith their application. *1*