Series SKS                                        Code No. **91**

Roll No. ☐☐☐☐☐☐☐

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

- 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** *question are compulsory.*

    (ii)    *Programming Language : C++*

1.  (a)    What is the benefit of using default parameter/argument in a function ? Give a suitable example to illustrate it using C++ code.    *2*

    (b)    Observe the following C++ code and write the name(s) of the header file(s), which will be essentially required to run it in a C++ compiler :    *1*

```
void main()
{
   float Area, Side;
   cin>>Area;
   Side=sqrt(Area);
   cout<<"One Side of the Square:"<<Side<<endl;
}
```

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(c) Observe the following C++ code carefully and rewrite the same after removing all the syntax error(s) present in the code. Ensure that you underline each correction in the code. **2**

Important Note :
- All the desired header files are already included, which are required to run the code.
- Correction should not change the logic of the program.

```
#define Change(A,B)  2*A+B;
void main()
{
    Float X,Y,F;
    cin>>X>>Y;
    F=Change[X,Y];
    cout<<"Result:"<<F<endline;
}
```

(d) Observe the following C++ code carefully and obtain the output, which will appear on the screen after execution of it. **2**

Important Note :
- All the desired header files are already included in the code, which are required to run the code.

```
void main()
{
    char *Text="AJANTA";
    int *P, Num[]={1,5,7,9};
    P=Num;
    cout<<*P<<Text<<endl;
    Text++;
    P++;
    cout<<*P<<Text<<endl;
}
```

(e) Observe the following C++ code carefully and obtain the output, which will appear on the screen after execution of it. 3

```cpp
#include <iostream.h>
class Mausam
{
    int City, Temp, Humidity;
public:
    Mausam(int C=1) {City=C; Temp=10; Humidity=63;}
    void Sun(int T) {Temp+=T;}
    void Rain(int H) {Humidity+=H;}
    void CheckOut()
    {
        cout<<City<<":"<<Temp<<"&"<<Humidity<<"%"<<endl;
    }
};

void main()
{
    Mausam M,N(2);
    M.Sun(5);
    M.CheckOut();
    N.Rain(10);
    N.Sun(2);
    N.CheckOut();
    M.Rain(15);
    M.CheckOut();
}
```

(f) Based on the following C++ code, find out the expected correct output(s) from the options (i) to (iv). Also, find out the minimum and the maximum value that can be assigned to the variable **Guess** used in the code at the time when value of **Turn** is 3.  2

```
void main()
{
    char Result[][10]={"GOLD","SILVER","BRONZE"};
    int Getit=9,Guess;
    for (int Turn=1;Turn<4;Turn++)
    {
        Guess=random(Turn);
        cout<<Getit-Guess<<Result[Guess]<<"*";
    }
}
```

(i)     9GOLD*9GOLD*8SILVER*

(ii)    9GOLD*7BRONZE*8GOLD*

(iii)   9GOLD*8SILVER*9GOLD*

(iv)    9GOLD*8SILVER*8GOLD*

2. (a) Write any two similarities between Constructors and Destructors. Write the function headers for constructor and destructor of a class **Flight**.  2

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

```
class Race
{
    int CarNo, Track;
public:
    Race();                 //Function 1
    Race(int CN);           //Function 2
    Race(Race &R);          //Function 3
    void Register();        //Function 4
    void Drive();           //Function 5
};
void main()
{
    Race R;
        :
}
```

(i) Out of the following, which of the options is correct for calling Function 2 ?

Option 1 - Race T(30);

Option 2 - Race U(R);

(ii) Name the feature of Object Oriented Programming, which is illustrated by Function 1, Function 2 and Function 3 combined together.

(c) Define a class Bus in C++ with the following specifications :  4

Data Members

- Busno – to store Bus No
- From – to store Place name of origin
- To – to store Place name of destination
- Type – to store Bus Type such as 'O' for ordinary
- Distance – to store the Distance in Kilometers
- Fare – to store the Bus Fare

Member Functions

- A constructor function to initialize Type as 'O' and Freight as 500

- A function CalcFare() to calculate Fare as per the following criteria:

Type        Fare
'O'         15*Distance
'E'         20*Distance
'L'         24*Distance

- A function **Allocate()** to allow user to enter values for Busno, From, To, Type and Distance. Also, this function should call **CalcFare()** to calculate Fare.

- A function **Show()** to display the content of all the data members on screen.

(d) Consider the following C++ code and answer the questions from (i) to (iv) : **4**

```cpp
class Personal
{
    int Class,Rno;
    char Section;
protected:
    char Name[20];
public:
    Personal();
    void Pentry();
    void Pdisplay();
};
class Marks: private Personal
{
    float M[5];
protected:
    char Grade[5];
public:
    Marks();
    void Mentry();
    void Mdisplay();
};
class Result: public Marks
{
    float Total, Agg;
public:
    char FinalGrade,Comments[20];
    Result();
    void Rcalculate();
    void Rdisplay();
};
```

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

(ii) Write the names of those data members, which can be directly accessed from the objects of class Result.

(iii) Write the names of those member functions, which can be directly accessed from the objects of class Result.

(iv) Write the names of those data members, which can be directly accessed from the Mentry() function of class Marks.

3. (a) Write code for a function void ChangeOver(int P[], int N) in C++, which re-positions all the elements of the array by shifting each of them to the next position and by shifting the last element to the first position.        3

For example: If the content of the array is

| 0 | 1 | 2 | 3 | 4 |
|----|----|----|----|----|
| 12 | 15 | 17 | 13 | 21 |

The changed content will be:

| 0 | 1 | 2 | 3 | 4 |
|----|----|----|----|----|
| 21 | 12 | 15 | 17 | 13 |

(b) An array T[15][10] is stored along the row in the memory with each element requiring 8 bytes of storage. If the base address of array T is 14000, find out the location of T[10][7].        3

(c) Write a user-defined function
DispTen(int A[][4],int N,int M)
in C++ to find and display all the numbers, which are divisible by 10. For example if the content of array is :        2

| 12 | 20 | 13 |
|----|----|----|
| 2 | 10 | 30 |

The output should be
20 10 30

(d) Evaluate the following postfix expression. Show the status of stack after execution of each operation:  2

5, 2, *, 50, 5, /, 5, −, +

(e) Write a function QDELETE() in C++ to perform delete operation on a Linked Queue, which contains Passenger no and Passenger name. Consider the following definition of node in the code.  4

```
struct node
{
    long int Pno;
    char Pname[20];
    node *Link;
};
```

4. (a) Fill in the blanks marked as Statement 1 and Statement 2, in the program segment given below with appropriate functions for the required task.  1

```
class Club
{
    long int MNo;          //Member Number
    char MName[20];        //Member Name
    char Email[30];        //Email of Member
public:
    void Register();       //Function to register member
    void Disp();           //Function to display details
    void ChangeEmail()     //Function to change Email
    {
        cout<<"Enter Changed Email:";
        cin>>Email;
    }
    long int GetMno(){return MNo;}
};
```

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```
void ModifyData()
{
  fstream File;
  File.open("CLUB.DAT",ios::binary|ios::in|ios::out);
  int Modify=0,Position;
  long int ModiMno;
  cout<<"Mno - whose email required to be modified:";
  cin>>ModiMno;
  Club CL;
  while (!Modify && File.read((char*)&CL,sizeof(CL)))
  {
    if (CL.GetMno()==ModiMno)
    {
      CL.ChangeEmail();
      Position=File.tellg()- sizeof(CL);
//Statement 1:To place file pointer to the required position
      _____;

//statement 2:To write the object CL on to the binary file
      _____;

      Modify++;
    }
  }
  if (Modify)
    cout<<"Email Changed..."<<endl;
  else
    cout<<"Member not found..."<<endl;
  File.close();
}
```

(b) Write a function CountYouMe () in C++ which reads the contents of a text file **story.txt** and counts the words **You** and **Me** (not case sensitive).

For example, if the file contains:
```
You are my best friend.
You and me make a good team.
```

The function should display the output as
```
Count for You: 2
Count for Me: 1
```

(c) Assuming the class ANTIQUE as declared below, write a function in C++ to read the objects of ANTIQUE from binary file **ANTIQUE.DAT** and display those antique items, which are priced between 10000 and 15000.

```cpp
class ANTIQUE
{
    int ANO;
    char Aname[10];
    float Price;
public:
    void BUY(){cin>>ANO;gets(Aname);cin>>Price;}
    void SHOW()
    {
        cout<<ANO<<endl;
        cout<<Aname<<endl;
        cout<<Price<<endl;
    }
    float GetPrice(){return Price;}
};
```

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**5.** (a) Explain the concept of candidate keys with the help of an appropriate example. 2

# NOTE :

Write SQL queries for (b) to (g) and write the outputs for the SQL queries mentioned shown in (h1) to (h4) parts on the basis of tables **PRODUCTS** and **SUPPLIERS**

Table: **PRODUCTS**

| PID | PNAME | QTY | PRICE | COMPANY | SUPCODE |
|-----|-------|-----|-------|---------|---------|
| 101 | DIGITAL CAMERA 14X | 120 | 12000 | RENIX | S01 |
| 102 | DIGITAL PAD 11i | 100 | 22000 | DIGI POP | S02 |
| 104 | PEN DRIVE 16 GB | 500 | 1100 | STOREKING | S01 |
| 106 | LED SCREEN 32 | 70 | 28000 | DISPEXPERTS | S02 |
| 105 | CAR GPS SYSTEM | 60 | 12000 | MOVEON | S03 |

Table: **SUPPLIERS**

| SUPCODE | SNAME | CITY |
|---------|-------|------|
| S01 | GET ALL INC | KOLKATA |
| S03 | EASY MARKET CORP | DELHI |
| S02 | DIGI BUSY GROUP | CHENNAI |

(b) To display the details of all the products in ascending order of product names (i.e. PNAME). 1

(c) To display product name and price of all those products, whose price is in the range of 10000 and 15000 (both values inclusive). 1

(d) To display the number of products, which are supplied by each supplier. i.e., the expected output should be:

```
S01    2
S02    2
S03    1
```

(e) To display the price, product name and quantity (i.e., qty) of those products which have quantity more than 100.

(f) To display the names of those suppliers, who are either from DELHI or from CHENNAI.

(g) To display the name of the companies and the name of the products in descending order of company names.

(h) Obtain the outputs of the following SQL queries based on the data given in tables PRODUCTS and SUPPLIERS above.

(h1) SELECT DISTINCT SUPCODE FROM PRODUCTS;

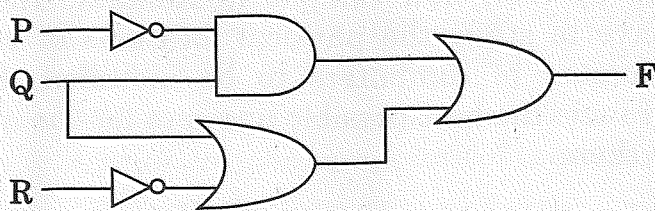(h2) SELECT MAX(PRICE),MIN(PRICE) FROM PRODUCTS;

(h3) SELECT PRICE*QTY AMOUNT
     FROM PRODUCTS WHERE PID=104;

(h4) SELECT PNAME,SNAME
     FROM PRODUCTS P, SUPPLIERS S
     WHERE P.SUPCODE=S.SUPCODE AND QTY>100;

6. (a) Verify the following using Boolean Laws

$$X+Z=X+X'.Z+Y.Z$$

(b)   Obtain the Boolean Expression for the logic circuit shown below :   2



(c)   Write the Sum of Product form of the function F(A,B,C) for the
following truth table representation of F.   1

| A | B | C | F |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 |

(d).   Obtain the minimal form for the following Boolean expression
using Karnaugh's Map.   3

$$F(U,V,W,Z) = \Sigma(0,1,2,3,6,7,8,9,10,13,15)$$

7.   (a)   Write two advantages of using an optical fibre cable over an
Ethernet cable to connect two service stations, which are 200 m
away from each other.   1

(b)   What is the difference between HTTP and FTP ?   1

(c) Rovenza Communications International (RCI) is an online corporate training provider company for IT related courses. The company is setting up their new campus in Kolkata. You as a network expert have to study the physical locations of various blocks and the number of computers to be installed. In the planning phase, provide the best possible answers for the queries (i) to (iv) raised by them.
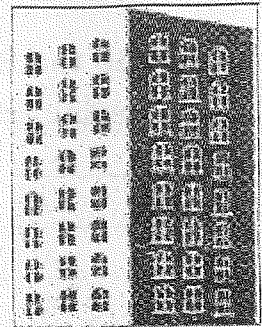
4

**Physical Locations of the blocks of RCI**
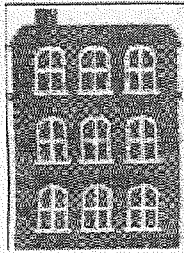


Administrative Block
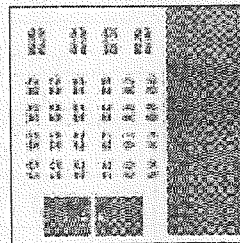
Finance Block

Faculty Recording Block

**Block to Block distances (in Mtrs.)**

| From | To | Distance |
|---|---|---|
| Administrative Block | Finance Block | 60 |
| Administrative Block | Faculty Recording Block | 120 |
| Finance Block | Faculty Recording Block | 70 |

**Expected Computers to be installed in each block**

| Block | Computers |
|---|---|
| Administrative Block | 30 |
| Finance Block | 20 |
| Faculty Recording Block | 100 |

(i)     Suggest the most appropriate block, where RCI should plan to install the server.

(ii)    Suggest the most appropriate block to block cable layout to connect all three blocks for efficient communication.

(iii)   Which type of network out of the following is formed by connecting the computers of these three blocks ?

- LAN
- MAN
- WAN

(iv)    Which wireless channel out of the following should be opted by RCI to connect to students from all over the world ?

- Infrared
- Microwave
- Satellite

(d)     Write two advantages of using open source software over proprietary software.                                                               *1*

(e)     Which of the following crime(s) does **not** come under cybercrime ?     *1*

(i)     Copying some important data from a computer without taking permission from the owner of the data.

(ii)    Stealing keyboard and mouse from a shop.

(iii)   Getting into unknown person's social networking account and start messaging on his behalf.