Roll No. ☐☐☐☐☐☐☐

- Please check that this question paper contains **13** 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) What is the difference between Actual Parameter and Formal Parameter ? Give a suitable example to illustrate both in a C++ code.   2

(b) Name the header file(s), which are essentially required to run the following program segment :   *1*

```
void main()
{
  char A='K',B;
  if (islower(A))
    B=toupper(A);
  else
    B='*';
  cout<<A<<" turned to "<<B<<endl;
}
```

(c) Find syntax error(s), if any, in the following program :   *2*

(Assuming all desired header file(s) are already included)

```
typedef String[80] char;
void main
{
  String S;
  for (L=0;L<26;C++)
    S[L]=L+65;
  S[L]='\0';
  cout<<S<<endline;
}
```

(d) Give the output of the following program segment :   *2*

(Assuming all desired header file(s) are already included)

```
void main()
{
  float *Ptr,Points[]={20,50,30,40,10};
  Ptr=Points;
  cout<<*Ptr<<endl;
  Ptr+=2;
  Points[2]+=2.5;
  cout<<*Ptr<<endl;
  Ptr++;
  (*Ptr)+=2.5;
  cout<<Points[3]<<endl;
}
```

91   2

(e) Write the output of the following program :   *3*

```cpp
#include <iostream.h>
class Quiz
{
   int Round;float Score;
public:
   Quiz(){Round=1;Score=0;}
   Quiz(Quiz &Q){Round=Q.Round+1;Score=Q.Score+10;}
   void GetBonus(float B=5)
   {
     Score+=B;
   }
   void ShowScore()
   {
     cout<<Round<<"#"<<Score<<endl;
   }
};
void main()
{
   Quiz A;
   A.ShowScore();
   A.GetBonus(10);
   A.ShowScore();
   Quiz B(A);
   B.GetBonus();
   B.ShowScore();
}
```

(f) Find out the expected correct output(s) from the options
     (i) to (iv) for the following C++ code. Also, find out the minimum
     and the maximum value that can be assigned to the variable
     Stop used in the code :   *2*

```cpp
void main()
{
   int Begin=3, Stop;
   for (int Run=1;Run<4;Run++)
   {
     Stop=random(Begin)+6;
     cout<<Begin++<<Stop<<"*";
   }
}
```

(i)   36*46*59*

(ii)   37*46*56*

(iii)   37*48*57*

(iv)   35*45*57*

2.   (a)   What is the relationship between a class and an object ? Illustrate with a suitable example.   2

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

```
class Book
{
    int BookNo;char BookTitle[20];
public:
    Book();                          //Function 1
    Book(Book &);                    //Function 2
    Book(int, char[]);               //Function 3
    void Buy();                      //Function 4
    void Sell();                     //Function 5
};
:

void main()
{

    :

    :


}
```

(i)   Name the feature of Object Oriented Programming demonstrated by Function 1, Function 2 and Function 3.

(ii)   Write statements in C++ to execute Function 3 and Function 4 inside the main() function.

    (c)   Define a class Seminar with the following specification :   4

private members

SeminarId	long
Topic	string of 20 characters
VenueLocation	string of 20 characters
Fee	float

CalcFee() function to calculate **Fee** depending on **VenueLocation**

VenueLocation	Fee
Outdoor	5000
Indoor Non-AC	6500
Indoor AC	7500

public members

> **Register()** function to accept values for SeminarID, Topic, VenueLocation and call **CalcFee()** to calculate **Fee**
>
> **ViewSeminar()** function to display all the data members on the screen

(d) Consider the following and answer the questions given below :   *4*

```
class ITEM
{
  char ICode[10];
protected:
  char IName[20];
public:
  ITEM();
  void Enter( );
  void Display( );
};
class SUPPLIER
{
  char SCode[10];
protected:
  char SName[25];
public:
  SUPPLIER();
  void TEnter( );
  void TDisplay( );
};
```

```
class SHOP: private SUPPLIER, public ITEM
{
   char SHOPADDRESS[15],SEmail[25];
public:
   SHOP();
   void Enter( );
   void Display( );
};
```

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

(ii)   Write the names of all the member functions accessible from Enter( ) function of class SHOP.

(iii) Write name of all the member functions accessible through an object of class SHOP.

(iv)   What will be the order of execution for the constructors ITEM(), SUPPLIER() and SHOP(), when an object of class SHOP is declared ?

3. (a) Write the definition for a function **void Transfer (int A[6], int B[6])** in C++, which takes two integer arrays, each containing 6 elements as parameters. The function should exchange all odd places (1st, 3rd and 5th) of the two arrays, for example   3

If the array A contains

15	10	12	21	52	76

And if the array B contains

23	41	67	83	13	53

Then the function should make the contents of the array A as

15	41	12	83	52	53

And the contents of array B as

23	10	67	21	13	76

(b) An array S[10][15] is stored in the memory with each element requiring 2 bytes of storage. If the base address of array S is 25000, determine the location of S[5][10] if the array is S stored along the column. 3

(c) Write a user-defined function int SumSingle(int A[4][4]) in C++, which finds and returns the sum of all numbers present in the first row of the array, for example, if the array contains 2

1	13	10	9
29	17	2	21
14	3	12	31
15	16	25	52

Then the function should return 33.

(d) Evaluate the following postfix expression using a stack and show the contents of stack after execution of each operation : 2

```
5, 3, 2, *, 4, 2, /, -, *
```

(e) Give the necessary declaration of linked implemented Queue containing players information (as defined in the following definition of Node). Also write a user defined function in C++ to delete one Player's information from the Queue. 4

```
struct Node
{
    int PlayerNo;
    char PlayerName[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 Agent
{
    long ACode;                      //Agent Code
    char AName[20];                  //Agent Name
    int Commission;
```

```
public:
   void Enter();    //Function to enter details of Agent
   void Display(); //Function to display details of Agent
   void Update(int C) //Function to modify commission
   {
      Commission= C;
   }
   int GetComm(){return Commission;}
   long GetAcode()  {return ACode;}
};
void ChangeCommission(long AC,int CM)
   // AC -> Agent Code, whose commission needs to change
   // CM -> New Commission
{
   fstream F;
   F.open(''AGENT.DAT'',ios::binary|ios::in|ios::out);
   char Changed='N';
   Agent A;
   while (Changed=='N' && F.read((char*)&A,sizeof(A)))
   {  if (A.GetAcode()==AC)
      {
         Changed = 'Y';
         A.Update(CM);
//Statement 1:To place file pointer to the required
                                              position
         _____ ;

//Statement 2:To write the object A on to the
                                          binary file
      _____ ;

      }
   }

   if (Changed=='N')
      cout<<"Agent not registered...";
   F.close();
}
```

(b) Write a function CountDig() in C++ which reads the content of a text file **story.txt** and displays the number of digits in it. 2

For example if the file contains :

```
Amrapali was a queen of Gareware kingdom in
the year 1911. She had 2 daughters.
Her palace had 200 rooms.
```

Then the output on the screen should be

```
Number of digits in Story:8
```

(c) Assuming the class WORKER as declared below, write a function in C++ to read the objects of WORKER from binary file named **WORKER.DAT** and display those records of workers, whose Wage is less than 300. 3

```
class WORKER
{
    int WNO;
    char WName[30];float Wage;
public:
    void Enter(){cin>>WNO;gets(WName);cin>>Wage;}
    void DISP(){cout<<ENO<<'*'<<WName<<'*'<<Wage<<endl;}
    float GetWage(){return Wage;}
};
```

5. (a) Differentiate between the Primary key and Alternate key of a table with the help of an example. 2

NOTE : Write SQL queries for (b) to (g) and write the outputs for (h) parts (i) to (iv) on the basis of tables **APPLICANTS** and **COURSES**

Table: **APPLICANTS**

NO	NAME	FEE	GENDER	C_ID	JOINYEAR
1012	Amandeep	30000	M	A01	2012
1102	Avisha	25000	F	A02	2009
1103	Ekant	30000	M	A02	2011
1049	Arun	30000	M	A03	2009
1025	Amber	40000	M	A02	2011
1106	Ela	40000	F	A05	2010
1017	Nikita	35000	F	A03	2012
1108	Arleena	30000	F	A03	2012
2109	Shakti	35000	M	A04	2011
1101	Kirat	25000	M	A01	2012

Table: **COURSES**

C_ID	COURSE
A01	FASHION DESIGN
A02	NETWORKING
A03	HOTEL MANAGEMENT
A04	EVENT MANAGEMENT
A05	OFFICE MANAGEMENT

(b) To display name, fee, gender, joinyear about the applicants, who have joined before 2010.   *1*

(c) To display the names of applicants, who are playing fee more than 30000.   *1*

(d) To display names of all applicants in ascending order of their joinyear.   *1*

(e) To display the year and the total number of applicants joined in each YEAR from the table APPLICANTS.   *1*

(f) To display the C_ID (i.e. Course ID) and the number of applicants registered in the course from the APPLICANTS table.   *1*

(g) To display the applicant's name with their respective course's name from the tables APPLICANTS and COURSES.   *1*

(h) Give the output of following SQL statements :   *2*

    (i)
```
SELECT Name, Joinyear FROM APPLICANTS
WHERE GENDER='F' and C_ID ='A02';
```

    (ii)
```
SELECT MIN(Joinyear) FROM APPLICANTS
WHERE Gender='M';
```

    (iii)
```
SELECT AVG(Fee) FROM APPLICANTS
WHERE C_ID='A01' OR C_ID='A05';
```

    (iv)
```
SELECT SUM(Fee),C_ID FROM APPLICANTS
GROUP BY C_ID
HAVING COUNT(*)=2;
```

6. **(a)** State DeMorgan's laws. Verify one of the DeMorgan's Laws using a truth table. 2

(b) Draw a logic circuit for the following Boolean expression. 2
A.B′+(C+B′).A′

(c) Obtain a simplified form for the following Boolean expression using Karnaugh's Map 3
$F(P,Q,R,S) = \Sigma\ (0,2,4,5,6,7,8,10,13,15)$

(d) Write the Product of Sum form of the function G(U,V,W) for the following truth table representation of G : 1

U	V	W	G(U,V,W)
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

7. (a) What is the difference between Packet Switching and Circuit Switching techniques ? *1*

(b) Expand the following abbreviations : *1*

(i) HTTP   (ii) VoIP

(c) G.R.K. International Inc. is planning to connect its Bengaluru Office Setup with its Head Office in Delhi. The Bengaluru Office G.R.K. International Inc. is spread across an area of approx. 1 square kilometer, consisting of 3 blocks — Human Resources, Academics and Administration.

You as a network expert have to suggest answers to the four queries (i) to (iv) raised by them.

Note : Keep the distances between blocks and no. of computers in each block in mind, while providing them the solutions.
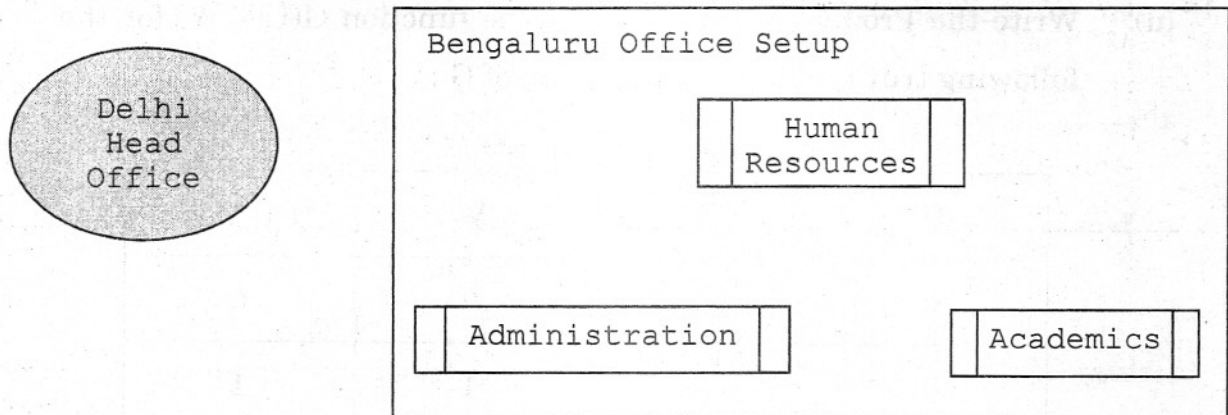
Shortest distances between various blocks :

Human Resources to Administration	100 m
Human Resources to Academics	65 m
Academics to Administration	110 m
Delhi Head Office to Bengaluru Office Setup	2350 km

Number of Computers installed at various blocks are as follows :

BLOCK	No. of Computers
Human Resources	155
Administration	20
Academics	100
Delhi Head Office	20

(i) Suggest the most suitable block in the Bengaluru Office Setup, to host the server. Give a suitable reason with your suggestion. *1*

(ii) Suggest the cable layout among the various blocks within the Bengaluru Office Setup for connecting the Blocks. *1*

(iii) Suggest a suitable networking device to be installed in each of the blocks essentially required for connecting computers inside the blocks with fast and efficient connectivity. *1*

(iv) Suggest the most suitable media to provide secure, fast and reliable data connectivity between Delhi Head Office and the Bengaluru Office Setup. *1*

(d) What is the difference between Email and Chat ? *1*

(e) Name one commonly used open source internet browser and one commonly used open source operating system. *1*