Code No. **91/1**

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)   What is the benefit of using function prototype for a function ? Give a suitable example to illustrate it using a 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 ( )
{
        int Number;
        cin>>Number;
        if (abs (Number) ==Number);
        cout<<"Positive"<<endl;
}
```

(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.

```cpp
#define Convert (P,Q) P+2*Q;

void main ()
{
    Float A, B, Result;
    cin>>A>>B ;
    Result=Convert [A,B] ;
    cout<<"Output:"<<Result<<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.

```cpp
void main ( )
{
    char *String="SHAKTI";
    int  *Point,Value[]={10,15,70,19};
    Point=Value;
    cout<<*Point<<String<<endl;
    String++;
    Point++;
    cout<<*Point<<String<<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 Aroundus
{
    int Place, Humidity, Temp;
public:
    Aroundus(int P=2) {Place=P; Humidity=60; Temp=20;}
    void Hot(int T) {Temp+=T;}
    void Humid(int H) {Humidity+=H;}
    void JustSee()
    {
    cout<<Place<<":"<<Temp<<"&"<<Humidity<<"%"<<endl;
    }
};
void main ( )
{
    Aroundus A,B(5);
    A.Hot(10);
    A.JustSee();
    B.Humid(15);
    B.Hot(2);
    B.JustSee();
    A.Humid(5);
    A.JustSee();
}
```

(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 **Trick** used in the code at the time when value of **Count** is 3 :   **2**

```
void main()
{
    char Status[][10]={"EXCEL","GOOD","OK"};
    int Turn=10,Trick;
    for(int Count=1;Count<4;Count++)
    {
        Trick=random(Count);
        cout<<Turn-Trick<<Status[Trick]<<"#";
    }
}
```

(i)   10EXCEL#10EXCEL#8OK#

(ii)   10EXCEL#8OK#9GOOD#

(iii) 10EXCEL#9GOOD#10EXCEL#

(iv) 10EXCEL#10GOOD#8OK#

2. (a) Write any two differences between Constructor and Destructor. Write the function headers for constructor and destructor of a class Member.   **2**

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

```
class Motor
{
    int MotorNo, Track;
    public:
        Motor();              //Function 1
        Motor(int MN);        //Function 2
        Motor(Motor &M);      //Function 3
        void Allocate();      //Function 4
        void Move();          //Function 5
};
```

```
void main()
{
    Motor M;
    :
    :
}
```

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

```
Option 1 - Motor N(M);

Option 2 - Motor P(10);
```

(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 Tourist in C++ with the following specification :   4

Data Members

- Carno - to store Bus No

- Origin - to store Place name

- Destination - to store Place name

- Type - to store Car Type such as 'E' for Economy

- Distance - to store the Distance in Kilometers

- Charge - to store the Car Fare

Member Functions

- A constructor function to initialize Type as 'E' and Freight as 250

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

```
Type          Charge
'E'           16*Distance
'A'           22*Distance
'L'           30*Distance
```

- A function **Enter()** to allow user to enter values for Carno, Origin, Destination, Type and Distance. Also, this function should call **CalcCharge()** 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 Student
{
    int Class,Rno;
    char Section;
protected :
    char SName[20];
public :
    Student();
    void Stentry();
    void Stdisplay();
};
class Score: private Student
{
    float Marks[5];
protected:
    char Grade[5];
public:
    Score ();
    void Sentry();
    void Sdisplay();
};
class Report: public Score
{
    float Total, Avg;
public:
    char OverallGrade, Remarks[20];
    Report();
    void REvaluate();
    void RPrint();
};
```

(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 Report.

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

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

3.   (a)   Write code for a function `void Convert(int T[],int Num)` in C++, which re-positions all the elements of the array by shifting each of them one to one position before and by shifting the first element to the last position.   **3**

For example : If the content of the array is

0	1	2	3	4
22	25	70	32	12

The changed content will be :

0	1	2	3	4
25	70	32	12	22

(b)   An array P[15][10] is stored along the column in the memory with each element requiring 4 bytes of storage. If the base address of array P is 14000, find out the location of P[8][5].   **3**

(c)   Write a user-defined function `DispNTen(int L[][4],int R,int C)` in C++ to find and display all the numbers, which are not divisible by 10. For example if the content of array is :   **2**

20	17	30
12	19	10

The output should be

17   12   19

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

`60, 6,/, 5, 2, *, 5, -, +`

(e) Write a function QINSERT() in C++ to perform insert operation on a Linked Queue, which contains Client no and Client name. Consider the following definition of NODE in the code of QINSERT(). **4**

```
struct NODE
{
    long int Cno;      //Client No
    char Cname[20];    //Client Name
    NODE *Next;
};
```

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 Customer
{
    long int CNo;      //Customer Number
    char CName[20];    //Customer Name
    char Email[30];    //Email of Customer
public:
    void Allocate();   //Function to allocate a member
    void Show();       //Function to show customer data
    void ModifyEmail() //Function to modify Email
    {
        Cout<<"Enter Modified Email:";
        gets(Email);
    }
    long int GetCno() {return CNo;}
};
```

```
void ChangeData()
{
    fstream File;
File.open("CUST.DAT",ios::binary|ios::in|ios::out);
    int Change=0,Location;
    long int ChangeCno;
    cout<<"Cno - whose email required to be modified:";
    cin>>ChangeCno;
    Customer CU;
    while(!Modify && File.read((char*)&CU,sizeof(CU)))
    {
        if (CU.GetCno()==ChangeCno)
        {
            CU.ModifyEmail();
            Location=File.tellg()- sizeof (CU);
//Statement 1:To place file pointer to the
required position

            _____;

//Statement 2:To write the object CU on to the
binary file

            _____;

        Change++;
        }
    }
    if (Change)
        cout<<"Email Modified... "<<endl;
    else
        cout<<"Customer not found... "<<endl;
    File.close();
}
```

(b) Write a function CountHisHer ( ) in C++ which reads the contents of a text file **diary.txt** and counts the words His and Her (not case sensitive).　　**2**

For example, if the file contains :

```
Pinaky has gone to his friend's house. His friend's
name is Ravya. Her house is 12 KM from here.
```

The function should display the output as

```
Count for His:2
Count for Her:1
```

(c) Assuming the class VINTAGE as declared below, write a function in C++ to read the objects of VINTAGE from binary file **VINTAGE.DAT** and display those vintage vehicles, which are priced between 200000 and 250000.　　**3**

```
class VINTAGE
{
     int VNO;          //Vehicle Number
     char VDesc[10];   //Vehicle Description
     float Price;
public :
     void GET() {cin>>VNO;gets (VDesc) ;cin>>Price;}
     void VIEW()
     {
     cout<<VNO<<endl;
     cout<<VDesc<<endl;
     cout<<Price<<endl;
     }
     float  ReturnPrice() {return  Price;}
};
```

5. (a) What is the difference between degree and cardinality of a table ? What is the degree and cardinality of the following table ? 2

Eno	Name	Salary
101	John Fedrick	45000
103	Raya Mazumdar	50600

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 **ITEMS** and **TRADERS**

Table : ITEMS

CODE	INAME	QTY	PRICE	COMPANY	TCODE
1001	DIGITAL PAD 12i	120	11000	XENITA	T01
1006	LED SCREEN 40	70	38000	SANTORA	T02
1004	CAR GPS SYSTEM	50	21500	GEOKNOW	T01
1003	DIGITAL CAMERA 12X	160	8000	DIGICLICK	T02
1005	PEN DRIVE 32 GB	600	1200	STOREHOME	T03

Table: TRADERS

TCODE	TNAME	CITY
T01	ELECTRONIC SALES	MUMBAI
T03	BUSY STORE CORP	DELHI
T02	DISP HOUSE INC	CHENNAI

(b) To display the details of all the items in ascending order of item names (i.e. INAME). 1

(c) To display item name and price of all those items, whose price is in the range of 10000 and 22000 (both values inclusive). 1

(d) To display the number of items, which are traded by each trader. The expected output of this query should be : 1

     T01 2

     T02 2

     T03 1

(e) To display the price, item name and quantity (i.e., qty) of those items which have quantity more than 150. 1

(f) To display the names of those traders, who are either from DELHI or from MUMBAI. 1

(g) To display the names of the companies and the names of the items in descending order of company names. 1

(h) Obtain the outputs of the following SQL queries based on the data given in tables ITEMS and TRADERS above. 2

```
h1) SELECT MAX(PRICE),MIN(PRICE) FROM ITEMS;

h2) SELECT PRICE*QTY AMOUNT

    FROM ITEMS WHERE CODE-1004;

h3) SELECT DISTINCT TCODE FROM ITEMS;

h4) SELECT INAME, TNAME

    FROM ITEMS I, TRADERS T

    WHERE I.TCODE=T.TCODE AND QTY<100;
```
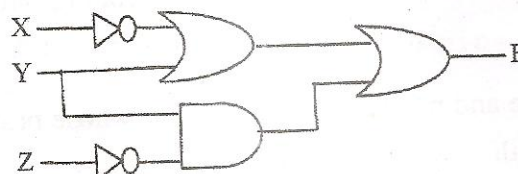
6. (a) Verify the following using Boolean Laws : 2

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

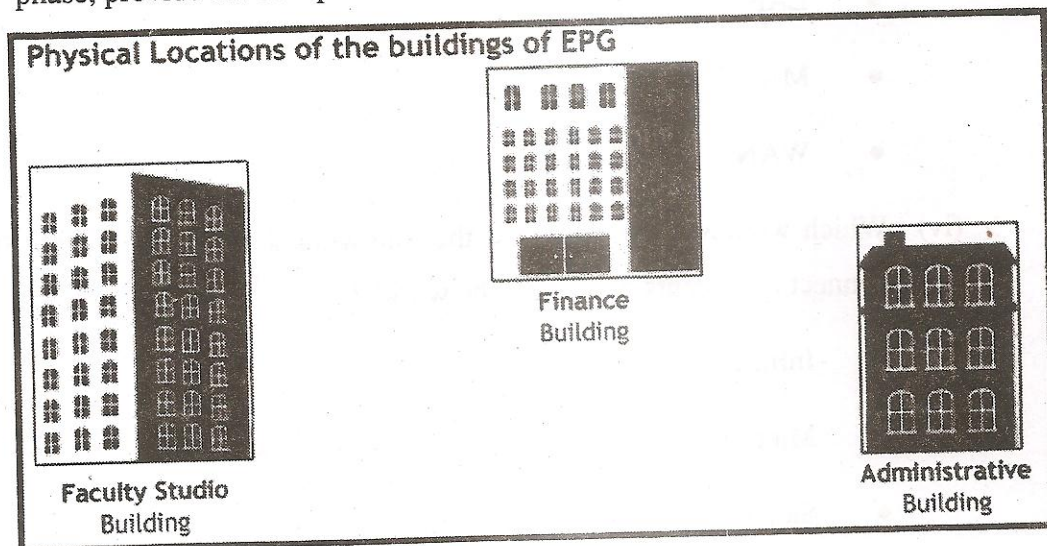(b) Obtain the Boolean Expression for the logic circuit shown below : 2

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

U	V	W	G
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) Obtain the minimal form for the following Boolean expression using Karnaugh's Map. **3**

$$H(P,Q,R,S) = \Sigma \ (0,1,2,3,5,7,8,9,10,14,15)$$

7. (a) What is the difference between domain name and IP address ? **1**

(b) Write two advantages of using an optical fibre cable over an Ethernet cable to connect two service stations, which are 190m away from each other. **1**

(c) Expertia Professional Global (EPG) is an online corporate training provider company for IT related courses. The company is setting up their new campus in Mumbai. You as a network expert have to study the physical locations of various buildings 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 buildings of EPG

Faculty Studio Building

Finance Building

Administrative Building

Building to Building distances (in Mtrs.)

From	To	Distance
Administrative Building	Finance Building	60
Administrative Building	Faculty Studio Building	120
Finance Building	Faculty Studio Building	70

Expected Computers to be installed in each Building :

Buildings	Computers
Administrative Building	20
Finance Building	40
Faculty Studio Building	120

(i)   Suggest the most appropriate building, where EPG should plan to install the server.

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

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

   - LAN

   - MAN

   - WAN

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

   - Infrared

   - Microwave

   - Satellite

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

(e) Which of the following crime(s) is/are covered under cybercrime ? **1**

    (i) Stealing brand new hard disk from a shop.

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

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

———————