

Roll No.

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

- Please check that this question paper contains **16** 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 :**

- All questions are compulsory.*
- Programming Language : C++*

1. (a) What is the difference between call by reference and call by value with respect to memory allocation ? Give a suitable example to illustrate 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()
{
    char CH,STR[20];

    cin>>STR;

    CH=toupper(STR[0]);

    cout<<STR<<"starts with"<<CH<<endl;

}
```

- (c) Rewrite the following C++ code after removing all the syntax error(s), if present in the code. Make sure that you underline each correction done by you in the code.

2

**Important Note :**

- Assume that all the required header files are already included, which are essential to run this code.
- The corrections made by you do not change the logic of the program.

```
typedef char[80] STR;

void main()

{
    Txt STR;

    gets(Txt);

    cout<<Txt[0]<<' \t'<<Txt[2];

    cout<<Txt<<endl;

}
```

- (d) Obtain the output from the following C++ program as expected to appear on the screen after its execution.

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) Obtain the output of the following C++ program, which will appear on the screen after its execution.

3

**Important Note :**

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

```
class Game
{
    int Level, Score;
    char Type;
public:
    Game(char GType='P')
    {Level=1;Score=0;Type=GType;}
    void Play(int GS);
    void Change();
    void Show()
    {
        cout<<Type<<"@"<<Level<<endl;
        cout<<Score<<endl;
    }
};
```

```

void main()
{
    Game A( 'G' ), B;
    B.Show();
    A.Play(11);
    A.Change();
    B.Play(25);
    A.Show();
    B.Show();
}
void Game::Change()
{
    Type=(Type=='P')?'G':'P';
}
void Game::Play(int GS)
{
    Score+=GS;
    if(Score>=30)
        Level=3;
    else if(Score>=20)
        Level=2;
    else
        Level=1;
}

```

- (f) Read the following C++ code carefully and find out, which out of the given options (i) to (iv) are the expected correct output(s) of it. Also, write the maximum and minimum value that can be assigned to the variable **Taker** used in the code :

2

```

void main()
{
    int GuessMe[4]={100,50,200,20};
    int Taker=random(2)+2;
    for (int Chance=0;Chance<Taker;Chance++)
        cout<<GuessMe[Chance]<<"#";
}

```

- (i) 100#
- (ii) 50#200#
- (iii) 100#50#200#
- (iv) 100#50

2. (a) What is function overloading ? Write an example using C++ to illustrate the concept of function overloading. 2

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

```
class Hospital
{
    int Pno, Dno;
public:
    Hospital(int PN);           //Function 1
    Hospital();                 //Function 2
    Hospital(Hospital &H);     //Function 3
    void In();                  //Function 4
    void Disp();                //Function 5
};

void main()
{
    Hospital H(20);            //Statement 1
}
```

(i) Which of the functions out of Function 1, 2, 3, 4 or 5 will get executed when the Statement 1 is executed in the above code ?

(ii) Write a statement to declare a new object G with reference to already existing object H using Function 3.

(c) Define a class Tourist in C++ with the following specification : 4

**Data Members**

- CNo - to store Cab No
- CType - to store a character 'A', 'B', or 'C' as City Type
- PerKM - to store per Kilo Meter charges
- Distance - to store Distance travelled (in KM)

## Member Functions

- A constructor function to initialize CType as 'A' and CNo as '0000'
- A function CityCharges( ) to assign PerKM as per the following table :

CType	PerKM
A	20
B	18
C	15

- A function **RegisterCab()** to allow administrator to enter the values for CNo and CType. Also, this function should call **CityCharges()** to assign PerKM Charges.
- A function **Display()** to allow user to enter the value of Distance and display CNo, CType, PerKM, PerKM\*Distance (as Amount) on screen.

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

4

```
class University
{
    long Id;
    char City[20];
protected:
    char Country[20];
public:
    University();
    void Register( );
    void Display( );
};
```

```

class Department: private University
{
    long DCode[10];
    char HOD[20];
protected:
    double Budget;
public:
    Department();
    void Enter();
    void Show();
};

class Student: public Department
{
    long RollNo;
    char Name[20];
public:
    Student();
    void Enroll();
    void View();
};

```

- (i) Which type of Inheritance is shown in the above example ?
- (ii) Write the names of those member functions, which are directly accessed from the objects of class Student.
- (iii) Write the names of those data members, which can be directly accessible from the member functions of class Student.
- (iv) Is it possible to directly call function Display() of class University from an object of class Department ?

(Answer as Yes or No).

3. (a) Write code for a function `void EvenOdd(int T[], int C)` in C++, to add 1 in all the odd values and 2 in all the even values of the array T. 3

Example : If the original content of the array T is

T[0]	T[1]	T[2]	T[3]	T[4]
35	12	16	69	26

The modified content will be :

T[0]	T[1]	T[2]	T[3]	T[4]
36	14	18	70	28

- (b) An array `A[20][30]` is stored along the row in the memory with each element requiring 4 bytes of storage. If the base address of array A is 32000, find out the location of `A[15][10]`. Also, find the total number of elements present in this array. 3
- (c) Write a user-defined function `AddEnd2(int A[][4], int N, int M)` in C++ to find and display the sum of all the values, which are ending with 2 (i.e., units place is 2). 2

For example if the content of array is :

22	16	12
19	5	2

The output should be

36

- (d) Evaluate the following postfix expression. Show the status of stack after execution of each operation separately : 2  
T, F, NOT, AND, T, OR, F, AND
- (e) Write a function `PUSHBOOK()` in C++ to perform insert operation on a Dynamic Stack, which contains `Book_no` and `Book_Title`. Consider the following definition of `NODE`, while writing your C++ code. 4

```
struct NODE
{
    int Book_No;
    char Book_Title[20];
    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 Agency
{
    int ANo; //Agent Code
    char AName[20]; //Agent Name
    char Mobile[12]; //Agent Mobile
public:
    void Enter(); //Function to enter details of agent
    void Disp(); //Function to display details of agent
    int RAno(){return ANo;}
    void UpdateMobile() //Function to update Mobile
    {
        cout<<"Updated Mobile:";
        gets(Mobile);
    }
};

void AgentUpdate()
{
    fstream F;
    F.open("AGENT.DAT",ios::binary|ios::in|ios::out);
    int Updt=0;
    int UAno;
    cout<<"Ano (Agent No - to update Mobile):";
    cin>>UAno;
    Agency A;
    while (!Updt && F.read((char*)&A,sizeof(A)))
    {
        if (A.RAno()==UAno)
        {
            //Statement 1:To call the function to Update Mobile No.
            _____ ;
        }
    }
}
```

```

//Statement 2:To reposition file pointer to re-write
                the updated object back in the file
                _____ ;
                F.write((char*)&A,sizeof(A));
                Updt++;
            }
        }

        if (Updt)
            cout<<"Mobile Updated for Agent"<<UAno<<endl;
        else
            cout<<"Agent not in the Agency"<<endl;
        F.close();
    }

```

- (b) Write a function `AECOUNT()` in C++, which should read each character of a text file **NOTES.TXT**, should count and display the occurrence of alphabets **A** and **E** (including small cases **a** and **e** too).

2

**Example :**

If the file content is as follows :

```

CBSE enhanced its
CCE guidelines further.

```

The `AECOUNT()` function should display the output as

```

A:1
E:7

```

- (c) Assuming the class TOYS as declared below, write a function in C++ to read the objects of TOYS from binary file **TOYS.DAT** and display those details of those TOYS, which are meant for children of AgeRange “5 to 8”.

3

```
class TOYS
{
    int ToyCode;
    char ToyName[10];
    char AgeRange;
public:
    void Enter()
    {
        cin>>ToyCode;
        gets(ToyName);
        gets(AgeRange);
    }
    void Display()
    {
        cout<<ToyCode<<": "<<ToyName<<endl;
        cout<<AgeRange<<endl;
    }
    char* WhatAge() {return AgeRange;}
};
```

5. (a) Explain the concept of Cartesian Product between two tables, with the help of appropriate example.

2

**NOTE :** Answer the questions (b) and (c) on the basis of the following tables **SHOPPE** and **ACCESSORIES**.

**Table : SHOPPE**

<b>Id</b>	<b>SName</b>	<b>Area</b>
S001	ABC Computronics	CP
S002	All Infotech Media	GK II
S003	Tech Shoppe	CP
S004	Geeks Tecno Soft	Nehru Place
S005	Hitech Tech Store	Nehru Place

**Table : ACCESSORIES**

<b>No</b>	<b>Name</b>	<b>Price</b>	<b>Id</b>
A01	Mother Board	12000	S01
A02	Hard Disk	5000	S01
A03	Keyboard	500	S02
A04	Mouse	300	S01
A05	Mother Board	13000	S02
A06	Keyboard	400	S03
A07	LCD	6000	S04
T08	LCD	5500	S05
T09	Mouse	350	S05
T10	Hard Disk	4500	S03

(b) Write the SQL queries :

4

- (i) To display Name and Price of all the Accessories in ascending order of their Price.
- (ii) To display Id and SName of all Shoppe located in Nehru Place.
- (iii) To display Minimum and Maximum Price of each Name of Accessories.
- (iv) To display Name, Price of all Accessories and their respective SName where they are available.

(c) Write the output of the following SQL commands :

2

- (i) `SELECT DISTINCT NAME FROM ACCESSORIES WHERE PRICE >= 5000;`
- (ii) `SELECT AREA, COUNT(*) FROM SHOPPE GROUP BY AREA;`
- (iii) `SELECT COUNT(DISTINCT AREA) FROM SHOPPE;`
- (iv) `SELECT NAME, PRICE*0.05 DISCOUNT FROM ACCESSORIES WHERE SNO IN ('S02', 'S03');`

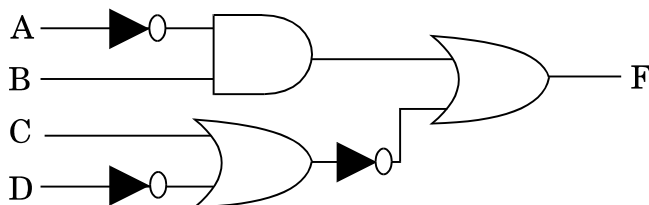
6. (a) Name the law shown below and verify it using a truth table.

2

$$X+X' \cdot Y = X+Y$$

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

2



- (c) Write the Product of Sum form of the function  $F(X, Y, Z)$  for the following truth table representation of  $F$  : 1

X	Y	Z	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

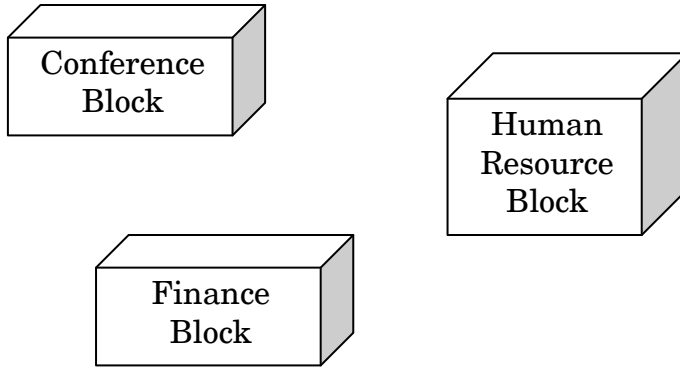
- (d) Obtain the minimal form for the following Boolean expression using Karnaugh's Map : 3

$$F(A, B, C, D) = \Sigma(1, 3, 4, 5, 6, 7, 12, 13)$$

7. (a) Write two characteristics of Wi-Fi. 1
- (b) What is the difference between E-mail and Chat ? 1
- (c) Expand the following : 1
- GSM
  - GPRS
- (d) Which type of network (out of LAN, PAN and MAN) is formed, when you connect two mobiles using Bluetooth to transfer a video ? 1

- (e) Tech Up Corporation (TUC) is a professional consultancy company. The company is planning to set up their new offices in India with its hub at Hyderabad. As a network adviser, you have to understand their requirement and suggest to them the best available solutions. Their queries are mentioned as (i) to (iv) below.

**Physical Locations of the blocks of TUC**



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

<b>Block (From)</b>	<b>Block (To)</b>	<b>Distance</b>
Human Resource	Conference	60
Human Resource	Finance	120
Conference	Finance	80

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

<b>Block</b>	<b>Computers</b>
Human Resource	125
Finance	25
Conference	60

- (i) What will the most appropriate block, where TUC should plan to install their server ? *1*
- (ii) Draw a block to block cable layout to connect all the buildings in the most appropriate manner for efficient communication. *1*
- (iii) What will be the best possible connectivity out of the following, you will suggest to connect the new setup of offices in Bangalore with its London based office ? *1*
- Infrared
  - Satellite Link
  - Ethernet Cable
- (iv) Which of the following devices will be suggested by you to connect each computer in each of the buildings ? *1*
- Gateway
  - Switch
  - Modem
- (f) Write names of any two popular Open Source Software, which are used as Operating Systems. *1*
- (g) Write any two important characteristics of Cloud Computing. *1*