

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 **20** 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 minute 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 :

- SECTION A refers to programming language C++.*
- SECTION B refers to programming language Python.*
- SECTION C is compulsory for all*
- Answer either SECTION A or SECTION B.*
- It is compulsory to mention on the page 1 in the answer book whether you are attempting SECTION A or SECTION B.*
- All questions are compulsory within each section.*

SECTION A

[Only for candidates, who opted for C++]

1. (a) Find the correct identifiers out of the following, which can be used for naming Variable, Constants or Functions in a C++ program : 2

For, while, INT, NeW, delete, 1stName, Add+Subtract, name1

- (b) Observe the following program very carefully and write the names of those header file(s), which are essentially needed to compile and execute the following program successfully : 1

```
typedef char STRING[80];
void main()
{
    STRING Txt[] = "We love Peace";
    int Count=0;
    while (Txt[Count]!='\0')
        if (isalpha(Txt[Count]))
            Txt[Count++]='@';
        else
            Txt[Count++]='#';
    puts (Txt);
}
```

- (c) Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined. 2

Note: Assume all required header files are already being included in the program.

```
#Define float MaxSpeed=60.5;
void main()
{
    int MySpeed
    char Alert='N';
    cin>>MySpeed;
    if MySpeed>MaxSpeed
        Alert='Y';
    cout<<Alert<<endl;
}
```

(d) Write the output of the following C++ program code : 2

Note : Assume all required header files are already being included in the program.

```
void Location(int &X,int Y=4)
{
    Y+=2;
    X+=Y;
}
void main()
{
    int PX=10,PY=2;
    Location(PY);
    cout<<PX<<" "<<PY<<endl;
    Location(PX,PY);
    cout<<PX<<" "<<PY<<endl;
}
```

(e) Write the output of the following C++ program code : 3

Note : Assume all required header files are already being included in the program.

```
class Eval
{
    char Level;
    int Point;
public:
    Eval() {Level='E' ;Point=0;}
    void Sink(int L)
    {
        Level-=L;
    }
    void Float(int L)
    {
        Level+=L;
        Point++;
    }
    void Show()
    {
        cout<<Level<<"#"<<Point<<endl;
    }
};
```

```

void main()
{
    Eval E;
    E.Sink(3);
    E.Show();
    E.Float(7);
    E.Show();
    E.Sink(2);
    E.Show();
}

```

- (f) Study the following program and select the possible output(s) from the options (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable VAL.

2

Note :

- Assume all required header files are already being included in the program.
- random(n) function generates an integer between 0 and n-1.

```

void main()
{
    randomize();
    int VAL;
    VAL=random(3)+2;
    char GUESS []="ABCDEFGH IJK";
    for (int I=1;I<=VAL; I++)
    {
        for(int J=VAL; J<=7;J++)
            cout<<GUESS[J];
        cout<<endl;
    }
}

```

- | (i) | (ii) | (iii) | (iv) |
|---------|--------|-------|------|
| BCDEFGH | CDEFGH | EFGH | FGHI |
| BCDEFGH | CDEFGH | EFGH | FGHI |
| | | EFGH | FGHI |
| | | EFGH | FGHI |

2. (a) What is a copy constructor ? Give a suitable example in C++ to illustrate with its definition within a class and a declaration of an object with the help of it. 2

(b) Observe the following C++ code and answer the questions (i) and (ii) :

```
class Passenger
{
    long PNR;
    char Name[20];
public:
    Passenger()                //Function 1
    { cout<<"Ready"<<endl; }

    void Book(long P,char N[]) //Function 2
    { PNR = P; strcpy(Name, N); }

    void Print()                //Function 3
    { cout<<PNR << Name <<endl; }

    ~Passenger()                //Function 4
    { cout<<"Booking cancelled!"<<endl; }
};
```

(i) Fill in the blank statements in Line 1 and Line 2 to execute Function 2 and Function 3 respectively in the following code : 1

```
void main()
{
    Passenger P;
    _____ //Line 1
    _____ //Line 2
} //Ends here
```

(ii) Which function will be executed at } // Ends here ? What is this function referred as ? 1

- (c) Write the definition of a class Photo in C++ with following description :

4

Private Members

- Pno //Data member for Photo Number (an integer)
- Category //Data member for Photo Category (a string)
- Exhibit //Data member for Exhibition Gallery (a string)
- FixExhibit //A member function to assign
//Exhibition Gallery as per Category
//as shown in the following table

Category	Exhibit
Antique	Zaveri
Modern	Johnsen
Classic	Terenida

Public Members

- Register() //A function to allow user to enter values
//Pno, Category and call FixExhibit() function
- ViewAll() //A function to display all the data members

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

4

```
class Interior
{
    int OrderId;
    char Address[20];
protected:
    float Advance;
public:
    Interior();
    void Book(); void View();
};
```

```

class Painting:public Interior
{
    int WallArea,ColorCode;
protected:
    char Type;
public:
    Painting();
    void PBook();
    void PView();
};

class Billing : public Painting
{
    float Charges;
    void Calculate();
public:
    Billing();
    void Bill();
    void BillPrint();
};

```

- (i) Which type of Inheritance out of the following is illustrated in the above example ?
 - Single Level Inheritance
 - Multi Level Inheritance
 - Multiple Inheritance
- (ii) Write the names of all the data members, which are directly accessible from the member functions of class Painting.
- (iii) Write the names of all the member functions, which are directly accessible from an object of class Billing.
- (iv) What will be the order of execution of the constructors, when an object of class Billing is declared ?

3. (a) Write the definition of a function `Change(int P[], int N)` in C++, which should change all the multiples of 10 in the array to 10 and rest of the elements as 1. For example, if an array of 10 integers is as follows :

P[0]	P[1]	P[2]	P[3]	P[4]	P[5]	P[6]	P[7]	P[8]	P[9]
100	43	20	56	32	91	80	40	45	21

After executing the function, the array content should be changed as follows :

P[0]	P[1]	P[2]	P[3]	P[4]	P[5]	P[6]	P[7]	P[8]	P[9]
10	1	10	1	1	1	10	10	1	1

- (b) A two dimensional array `ARR[50][20]` is stored in the memory along the row with each of its elements occupying 4 bytes. Find the address of the element `ARR[30][10]`, if the element `ARR[10][5]` is stored at the memory location 15000.

- (c) Write the definition of a member function `PUSH()` in C++, to add a new book in a dynamic stack of `BOOKS` considering the following code is already included in the program :

```
struct BOOKS
{
    char ISBN[20], TITLE[80];
    BOOKS *Link;
};
class STACK
{
    BOOKS *Top;
public:
    STACK() {Top=NULL;}
    void PUSH();
    void POP();
    ~STACK();
};
```


- (d) Write a function REVROW(int P[][5],int N,int M) in C++ to display the content of a two dimensional array, with each row content in reverse order. 3

For example, if the content of array is as follows :

15	12	56	45	51
13	91	92	87	63
11	23	61	46	81

The function should display output as

```
51 45 56 12 15
63 87 92 91 13
81 46 61 23 81
```

- (e) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion : 2

$U * V + R / (S - T)$

4. (a) Write function definition for TOWER() in C++ to read the content of a text file WRITEUP.TXT, count the presence of word TOWER and display the number of occurrences of this word. 2

Note :

- The word TOWER should be an independent word
- Ignore type cases (i.e. lower/upper case)

Example :

If the content of the file WRITEUP.TXT is as follows :

<pre>Tower of hanoi is an interesting problem. Mobile phone tower is away from here. Views from EIFFEL TOWER are amazing.</pre>

The function TOWER() should display the following :

3

- (b) Write a definition for function COSTLY() in C++ to read each record of a binary file GIFTS.DAT, find and display those items, which are priced more than 2000. Assume that the file GIFTS.DAT is created with the help of objects of class GIFTS, which is defined below :

3

```
class GIFTS
{
    int CODE;char ITEM[20]; float PRICE;
public:
    void Procure()
    {
        cin>>CODE; gets (ITEM);cin>>PRICE;
    }
    void View()
    {
        cout<<CODE<<" : "<<ITEM<<" : "<<PRICE<<endl;
    }
    float GetPrice() {return PRICE;}.
};
```

- (c) Find the output of the following C++ code considering that the binary file MEMBER.DAT exists on the hard disk with records of 100 members :

1

```
class MEMBER
{
    int Mno; char Name[20];
public:
    void In();void Out();
};

void main()
{
    fstream MF;
    MF.open("MEMBER.DAT",ios::binary|ios::in);
    MEMBER M;
    MF.read((char*)&M, sizeof(M));
    MF.read((char*)&M, sizeof(M));
    MF.read((char*)&M, sizeof(M));
    int POSITION= MF.tellg()/sizeof(M);
    cout<<"PRESENT RECORD:"<<POSITION<<endl;
    MF.close();
}
```

SECTION B

[Only for candidates, who opted for Python]

1. (a) How is `__init()` different from `__del()`? 2
- (b) Name the function/method required to 1
- (i) check if a string contains only alphabets
 - (ii) give the total length of the list
- (c) Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code. 2

```
def Sum(Count) #Method to find sum
    S=0
    for I in Range(1,Count+1):
        S+=I
    RETURN S
print Sum[2] #Function Call
print Sum[5]
```

- (d) Find and write the output of the following python code : 2

```
for Name in ['John', 'Garima', 'Seema', 'Karan']:
    print Name
    if Name[0]=='S':
        break
else:
    print 'Completed!'
print 'Weldone!'
```

(e) Find and write the output of the following python code :

3

```
class Emp:
    def __init__(self,code,nm): #constructor
        self.Code=code
        self.Name=nm
    def Manip(self):
        self.Code=self.Code+10
        self.Name='Karan'
    def Show(self,line):
        print self.Code,self.Name,line

s=Emp(25,'Mamta')
s.Show(1)
s.Manip()
s.Show(2)
print s.Code+len(s.Name)
```

(f) What are the possible outcome(s) executed from the following code ? Also specify the maximum and minimum values that can be assigned to variable COUNT.

2

```
TEXT="CBSEONLINE"
COUNT=random.randint(0,3)
C=9
while TEXT[C]!='L':
    print TEXT[C]+TEXT[COUNT]+'*',
    COUNT=COUNT+1
    C=C-1
```

(i)	(ii)	(iii)	(iv)
EC*NB*IS*	NS*IE*LO*	ES*NE*IO*	LE*NO*ON*

2. (a) Illustrate the concept inheritance with the help of a python code. 2
- (b) What will be the output of the following python code ? Explain the try and except used in the code. 2

```

A=0
B=6
print 'One'
try:
    print 'Two'
    X=B/A
    Print 'Three'
except ZeroDivisionError:
    print B*2
    print 'Four'
except:
    print B*3
    print 'Five'

```

- (c) Write a class PHOTO in Python with following specifications : 4

Instance Attributes

- Pno # Numeric value
- Category # String Value
- Exhibit # Exhibition Gallery with String value

Methods:

- FixExhibit() #A method to assign
#Exhibition Gallery as per Category
#as shown in the following table

Category	Exhibit
Antique	Zaveri
Modern	Johnsen
Classic	Terenida

- Register() #A function to allow user to enter values
#Pno, Category and call FixExhibit() method
- ViewAll() #A function to display all the data members

- (d) What is operator overloading with methods ? Illustrate with the help of an example using a python code. 2
- (e) Write a method in python to display the elements of list twice, if it is a number and display the element terminated with '*' if it is not a number. 2

For example, if the content of list is as follows :

MyList=['RAMAN' , '21' , 'YOGRAJ' , '3' , 'TARA']

The output should be

RAMAN*

2121

YOGRAJ*

33

TARA*

3. (a) What will be the status of the following list after fourth pass of bubble sort and fourth pass of selection sort used for arranging the following elements in descending order ? 3
34 , -6 , 12 , -3 , 45 , 25
- (b) Write a method in python to search for a value in a given list (assuming that the elements in list are in ascending order) with the help of Binary Search method. The method should return -1, if the value not present else it should return position of the value present in the list. 2
- (c) Write PUSH(Names) and POP(Names) methods in python to add Names and Remove names considering them to act as Push and Pop operations of Stack. 4
- (d) Write a method in python to find and display the composite numbers between 2 to N. Pass N as argument to the method. 3
- (e) Evaluate the following postfix notation of expression. Show status of stack after every operation. 2
34 , 23 , + , 4 , 5 , * , -

4. (a) Differentiate between the following : 1
- (i) `f = open('diary.txt', 'a')`
- (ii) `f = open('diary.txt', 'w')`
- (b) Write a method in python to read the content from a text file story.txt line by line and display the same on screen. 2
- (c) Consider the following definition of class Student. Write a method in python to write the content in a pickled file student.dat. 3

```
class Student:

    def __init__(self,A,N):

        self.Admno=A

        self.Name=N

    def Show(self):

        print(self.Admno,"#",self.Name)
```

SECTION C

[For all candidates]

5. (a) Observe the following table carefully and write the names of the most appropriate columns, which can be considered as (i) candidate keys and (ii) primary key : 2

Code	Item	Qty	Price	Transaction Date
1001	Plastic Folder 14"	100	3400	2014-12-14
1004	Pen Stand Standard	200	4500	2015-01-31
1005	Stapler Mini	250	1200	2015-02-28
1009	Punching Machine Small	200	1400	2015-03-12
1003	Stapler Big	100	1500	2015-02-02

- (b) Consider the following DEPT and EMPLOYEE tables. Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii). 6

Table : DEPT

DCODE	DEPARTMENT	LOCATION
D01	INFRASTRUCTURE	DELHI
D02	MARKETING	DELHI
D03	MEDIA	MUMBAI
D05	FINANCE	KOLKATA
D04	HUMAN RESOURCE	MUMBAI

Table : EMPLOYEE

ENO	NAME	DOJ	DOB	GENDER	DCODE
1001	George K	2013-09-02	1991-09-01	MALE	D01
1002	Ryma Sen	2012-12-11	1990-12-15	FEMALE	D03
1003	Mohitesh	2013-02-03	1987-09-04	MALE	D05
1007	Anil Jha	2014-01-17	1984-10-19	MALE	D04
1004	Manila Sahai	2012-12-09	1986-11-14	FEMALE	D01
1005	R SAHAY	2013-11-18	1987-03-31	MALE	D02
1006	Jaya Priya	2014-06-09	1985-06-23	FEMALE	D05

Note : DOJ refers to date of joining and DOB refers to date of Birth of employees.

- (i) To display Eno, Name, Gender from the table EMPLOYEE in ascending order of Eno.
- (ii) To display the Name of all the MALE employees from the table EMPLOYEE.

- (iii) To display the Eno and Name of those employees from the table EMPLOYEE who are born between '1987-01-01' and '1991-12-01'.
- (iv) To count and display FEMALE employees who have joined after '1986-01-01'.
- (v) `SELECT COUNT(*) ,DCODE FROM EMPLOYEE
GROUP BY DCODE HAVING COUNT(*)>1;`
- (vi) `SELECT DISTINCT DEPARTMENT FROM DEPT;`
- (vii) `SELECT NAME ,DEPARTMENT FROM EMPLOYEE E ,DEPT D
WHERE E.DCODE=D.DCODE AND ENO<1003;`
- (viii) `SELECT MAX(DOJ) , MIN(DOB) FROM EMPLOYEE;`

6. (a) Verify the following using Boolean Laws : 2

$$U' + V = U'V' + U' \cdot V + U \cdot V$$

(b) Draw the Logic Circuit for the following Boolean Expression : 2

$$(X' + Y) \cdot Z + W'$$

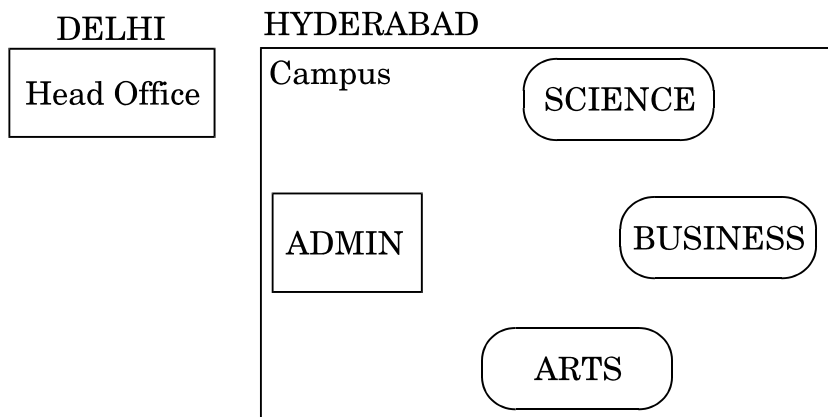
(c) Derive a Canonical POS expression for a Boolean function F, represented by the following truth table : 1

P	Q	R	F(P, Q, R)
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

(d) Reduce the following Boolean Expression to its simplest form using K-Map : 3

$$F(X, Y, Z, W) = \sum(0, 1, 4, 5, 6, 7, 8, 9, 11, 15)$$

7. (a) Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks. 1
- (b) What kind of data gets stored in cookies and how is it useful ? 1
- (c) Differentiate between packet switching over message switching ? 1
- (d) Out of the following, which is the fastest (i) wired and (ii) wireless medium of communication ? 1
 Infrared, Coaxial Cable, Ethernet Cable, Microwave, Optical Fiber
- (e) What is Trojan Horse ? 1
- (f) Out of the following, which all comes under cyber crime ? 1
- (i) Stealing away a brand new hard disk from a showroom.
- (ii) Getting in someone's social networking account without his consent and posting on his behalf.
- (iii) Secretly copying data from server of an organization and selling it to the other organization.
- (iv) Looking at online activities of a friends blog.
- (g) Xcelencia Edu Services Ltd. is an educational organization. It is planning to set up its India campus at Hyderabad with its head office at Delhi. The Hyderabad campus has 4 main buildings - ADMIN, SCIENCE, BUSINESS and ARTS. You as a network expert have to suggest the best network related solutions for their problems raised in (i) to (iv), keeping in mind the distances between the buildings and other given parameters.



Shortest distances between various buildings :

ADMIN to SCIENCE	65 m
ADMIN to BUSINESS	100 m
ADMIN to ARTS	60 m
SCIENCE to BUSINESS	75 m
SCIENCE to ARTS	60 m
BUSINESS to ARTS	50 m
DELHI Head Office to HYDERABAD Campus	1600 Km

Number of computers installed at various buildings are as follows :

ADMIN	100
SCIENCE	85
BUSINESS	40
ARTS	12
DELHI Head Office	20

- (i) Suggest the most appropriate location of the server inside the HYDERABAD campus (out of the 4 buildings), to get the best connectivity for maximum number of computers. Justify your answer. 1
- (ii) Suggest and draw the cable layout to efficiently connect various buildings within the HYDERABAD campus for connecting the computers. 1
- (iii) Which hardware device will you suggest to be procured by the company to be installed to protect and control the internet uses within the campus ? 1

(iv) Which of the following will you suggest to establish the online face-to-face communication between the people in the Admin Office of HYDERABAD campus and DELHI Head Office ?

1

(i) E-mail

(ii) Text Chat

(iii) Video Conferencing

(iv) Cable TV