SET – 4

Code No. **91/1**

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

Roll No.

- 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 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***

**General Instructions :**

   (i)    *Programming Language in SECTION A : C++.*

   (ii)   *Programming Language in SECTION B : Python.*

   (iii)  *Answer either SECTION A or B, and SECTION C is compulsory.*

   (iv)   *It is compulsory to mention on the page 1 in answer book whether you are attempting SECTION A or SECTION B.*

   (v)    *All questions are compulsory within each section.*

## SECTION – A

### (Only for Candidates, who opted for  C++)

1.   (a)   Out of the following, find those identifiers, which cannot be used for naming Variable, Constants or Functions in a C++ program :     **2**
```
_Cost, Price*Qty, float, Switch,
Address One, Delete, Number12, do
```

(b) Jayapriya has started learning C++ and has typed the following program. When she compiled the following code written by her, she discovered that she needs to include some header files to successfully compile and execute it. Write the names of those header files, which are required to be included in the code.  **1**

```
void main()
{
    float A,Number,Outcome;
    cin>>A>>Number;
    Outcome=pow(A,Number);
    cout<<Outcome<<endl;
}
```

(c) Rewrite the following C++ code 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 Equation(p,q)=p+2*q
void main()
{
    float A=3.2;B=4.1;
    C=Equation(A,B);
    cout<<'Output='<<C<<endl;
}
```

(d) Find and write the output of the following C++ program code :  **2**

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

```
typedef char STRING[80];
void MIXITNOW(STRING S)
{
    int Size=strlen(S);
    for(int I=0;I<Size-1;I+=2)
    {
        char WS=S[I];
        S[I]=S[I+1];
        S[I+1]=WS;
    }
for(I=1;I<Size;I+=2)
    if(S[I]>='M' && S[I]<='U')
        S[I]='@';
}
void main()
{
    STRING Word="CRACKAJACK";
    MIXITNOW(Word);
    cout<<Word<<endl;
}
```

(e) Find and write the output of the following C++ program code :   **3**

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

```cpp
class Stock
{
    long int ID;
    float Rate;
    int Date;
public:
    Stock(){ID=1001;Rate=200;Date=1;}
    void RegCode(long int I,float R)
    {
        ID=I;
        Rate=R;
    }
    void Change(int New,int DT)
    {
        Rate+=New;
        Date=DT;
    }
    void Show()
    {
        cout<<"Date :"<<Date<<endl;
        cout<<ID<<"#"<<Rate<<endl;
    }
};
void main()
{
    Stock A,B,C;
    A.RegCode(1024,150);
    B.RegCode(2015,300);
    B.Change(100,29);
    C.Change(-20,20);
    A.Show();
    B.Show();
    C.Show();
}
```

(f) Look at the following C++ code and find 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 CHANGER. **2**

Note :

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

```
void main()
{
    randomize();
    int CHANGER;
    CHANGER=random(3);
char CITY[][25]={"DELHI","MUMBAI","KOLKATA","CHENNAI"};
for(int I=0;I<=CHANGER;I++)
{
    for(int J=0;J<=I;J++)
        cout<<CITY[J];
    cout<<endl;
}
}
```

| (i) | (ii) |
|---|---|
| DELHI<br>DELHIMUMBAI<br>DELHIMUMBAIKOLKATA | DELHI<br>DELHIMUMBAI<br>DELHIMUMBAIKOLKATA<br>DELHIMUMBAIKOLKATACHENNAI |
| (iii) | (iv) |
| MUMBAI<br>MUMBAIKOLKATA<br>MUMBAIKOLKATACHENNAI | KOLKATA<br>KOLKATACHENNAI |

2. (a) Differentiate between Constructor and Destructor functions giving suitable example using a class in C++. When does each of them execute ? **2**

(b) Observe the following C++ code and answer the questions (i) and (ii). Assume all necessary files are included :

```
class FICTION
{
    long FCode;
    char FTitle[20];
    float FPrice;
Public:
```

```
        FICTION()                          //Member Function 1
        {
            cout<<"Bought"<<endl;
            FCode=100;strcpy(FTitle,"Noname");FPrice=50;
        }
        FICTION(int C,char T[],float P) // Member Function 2
        {
            FCode=C;
            strcpy(FTitle,T);
            FPrice=P;
        }
        void Increase(float P)          // Member Function 3
        {
            FPrice+=P;
        }

        void Show()                      // Member Function 4
        {
            cout<<FCode<<":"<<FTitle<<":"<<FPrice<<endl;
        }
        ~FICTION()                        // Member Function 5
        {
            cout<<"Fiction removed!" <<endl;
        }
};
void main()                                   //Line 1
{                                             //Line 2
    FICTION F1,F2(101,"Dare",75);             //Line 3
    for (int I=0;I<4;I++)                      //Line 4
    {                                         //Line 5
        F1.Increase(20);F2.Increase(15);      //Line 6
        F1.Show();F2.Show();                  //Line 7
    }                                         //Line 8
}                                             //Line 9
```

(i) Which specific concept of object oriented programming out of the following is illustrated by Member Function 1 and Member Function 2 combined together ? **1**

- Data Encapsulation
- Data Hiding
- Polymorphism
- Inheritance

(ii) How many times the message "Fiction removed!" will be displayed after executing the above C++ code ? Out of Line 1 to Line 9, which line is responsible to display the message "Fiction removed!" ? **1**

**91/1**        **5**        **[P.T.O.**

(c) Write the definition of a class METROPOLIS in C++ with following description : **4**
Private Members

```
– MCode       //Data member for Code (an integer)
– MName       //Data member for Name (a string)
– MPop        //Data member for Population (a long int)
– Area        //Data member for Area Coverage (a float)
– PopDens     //Data member for Population Density ( a float)
– CalDen()    //A member function to calculate -------
              //Density as PopDens/Area
Public Members
– Enter()     //A function to allow user to enter values of
              //Mcode,MName,MPop,Area and call CalDen()
              //function
– ViewALL()   //A function to display all the data members
              //also display a message "Highly Populated Area"
              //if the Density is more than 12000
```

(d) Answer the questions (i) to (iv) based on the following : **4**

```cpp
class PRODUCT
{
    int Code;
    char Item[20];
protected:
    float Qty;
public:
    PRODUCT();
    void GetIn(); void Show();
};
class WHOLESALER
{
    int WCode;
protected:
    char Manager[20];
public:
    WHOLESALER();
    void Enter();
    void Display();
};
class SHOWROOM : public PRODUCT, private WHOLESALER
{
    char Name[20],City[20];
public:
    SHOWROOM();
    void Input();
    void View();
};
```

91/1                                6

(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 SHOWROOM.

(iii) Write the names of all the member functions, which are directly accessible by an object of class SHOWROOM.

(iv) What will be the order of execution of the constructors, when an object of class SHOWROOM is declared ?

3. (a) Write the definition of a function FixPay(float Pay[], int N) in C++, which should modify each element of the array Pay having N elements, as per the following rules : **2**

| Existing Value of Pay | Pay to be changed to |
|---|---|
| If less than 100000 | Add 25% in the existing value |
| If >=100000 and <20000 | Add20% in the existing value |
| If >=200000 | Add 15% in the existing value |

(b) T[20][50] is a two dimensional array, which is stored in the memory along the row with each of its element occupying 4 bytes, find the address of the element T[15][5], if the element T[10][8] is stored at the memory location 52000. **3**

(c) Write the definition of a member function INSERT() for a class QUEUE in C++, to insert an ITEM in a dynamically allocated Queue of items considering the following code is already written as a part of the program. **4**

```
struct ITEM
{
    int INO; char INAME[20];
    ITEM *Link;
};
class QUEUE
{
    ITEM *R,*F;
public :
    QUEUE() {R=NULL;F=NULL;}
    void INSERT();
    void DELETE();
    ~QUEUE();
};
```

(d) Write definition for a function SHOWMID(int P[][5], int R, int C) in C++ to display the elements of middle row and middle column from a two dimensional array P having R number of rows and C number of columns.

For example, if the content of array is as follows :     **3**

| 115 | 112 | 116 | 101 | 125 |
|-----|-----|-----|-----|-----|
| 103 | 101 | 121 | 102 | 101 |
| 185 | 109 | 109 | 160 | 172 |

The function should display the following as output :

```
103    101    121    102    101
116    121    109
```

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

```
A/(B+C)*D−E
```

4. (a) Write function definition for WORD4CHAR() in C++ to read the content of a text file FUN.TXT, and display all those words, which has four characters in it.     **2**

Example :

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

```
When I was a small child, I used to play in the
garden with my grand mom. Those days were amazingly
funful and I remember all the moments of that time
```

The function WORD4CHAR() should display the following :

```
When used play with days were that time
```

(b) Write a definition for function BUMPER() in C++ to read each object of a binary file GIFTS.DAT, find and display details of those gifts, which has remarks as "ÖN DISCOUNT". Assume that the file GIFTS.DAT is created with the help of objects of class GIFTS, which is defined below :     **3**

```cpp
class GIFTS
{
    int ID;char Gift[20],Remarks[20]; float Price;
public:
    void Takeonstock()
    {
        cin>>ID;gets(Gift);gets(Remarks);cin>>Price;
    }
    void See()
    {

        cout<<ID<<":"<<Gift<<":"<<Price<<"":"<<Remarks<<endl;
    }
    char *GetRemarks() {return Remarks;}
};
```

(c) Find the output of the following C++ code considering that the binary file MEM.DAT exists on the hard disk with a data of 1000 members : **1**

```cpp
class MEMBER
{
    int Mcode;char MName[20];
public:
    void Register();void Display();
};

void main()
{
    fstream MFile;
    MFile.open("MEM.DAT", ios::binary|ios::in);
    MEMBER M;
    MFile.read((char*)&M, sizeof(M));
    cout<<"Rec:"<<MFile.tellg()/sizeof(M)<<endl;
    MFile.read((char*)&M, sizeof(M));
    MFile.read((char*)&M, sizeof(M));
    cout<<"Rec:""<<MFile.tellg()/sizeof(M)<<endl;
    MFile.close();
}
```

## SECTION – B
### (Only for Candidates, who opted for Python)

1. (a) Out of the following, find those identifiers, which cannot be used for naming Variable or Functions in a Python program : **2**

```
Price*Qty, class, For, do,
4thCol, totally, Row31, _Amount
```

(b) Name the Python Library modules which need to be imported to invoke the following functions : **1**
   (i) `load()`
   (ii) `pow()`

(c) Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code. **2**
```python
for Name in [Amar,Shveta,Parag]
    IF Name[0]='S':
        print(Name)
```

(d) Find and write the output of the following python code : **2**
```python
Numbers = [9,18,27,36]
for Num in Numbers:
    for N in range(1, Num%8):
        print(N,"#",end="")
    print()
```

91/1           **9**           **[P.T.O.**

(e) Find and write the output of the following python code : 3

```python
class Notes:
    def __init__(self,N=100,Nt="CBSE"): #constructor
        self.Nno=N
        self.NName=Nt
    def Allocate(self,N,Nt):
        self.Nno= self.Nno + N
        self.NName= Nt + self.Nname
    def Show(self):
        print(self.Nno,"#",self.NName)
s=Notes()
t=Notes(200)
u=Notes(300,"Made Easy")
s.Show()
t.Show()
u.Show()
s.Allocate(4,"Made")
t.Allocate(10,"Easy")
u.Allocate(25,"Made Easy")
s.Show()
t.Show()
u.Show()
```

(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 PICKER. 2

```python
import random
PICK=random.randint(0,3)
CITY=["DELHI","MUMBAI","CHENNAI","KOLKATA"];
for I in CITY:
    for J in range(1,PICK):
        print(I,end="")
    print()
```

| (i) | (ii) |
|---|---|
| DELHIDELHI<br>MUMBAIMUMBAI<br>CHENNAICHENNAI<br>KOLKATAKOLKATA | DELHI<br>DELHIMUMBAI<br>DELHIMUMBAICHENNAI |
| (iii) | (iv) |
| DELHI<br>MUMBAI<br>CHENNAI<br>KOLKATA | DELHI<br>MUMBAIMUMBAI<br>KOLKATAKOLKATAKOLKATA |

2.  (a)  What is the difference between Multiple and Multilevel inheritance ? Give suitable examples to illustrate both. **2**

    (b)  What will be the output of the following python code considering the following set of inputs ? **2**

    **JAYA**

    **My 3 books**

    **PICK2**

    **2120**

    Also, explain the try and except used in the code.

```
Counter=0
while True:
    try :
        Number=int(raw_input("Give a Number"))
        break
    except ValueError:
        Counter=Counter+2
        print("Re-enter Number")
print(Counter)
# For later versions of python, raw_input
# should be considered as input
```

    (c)  Write a class CITY in Python with following specifications : **4**

```
Instance Attributes
- Code     # Numeric value
- Name     # String value
- Pop       # Numeric value for Population
- KM        # Numeric value
- Density  # Numeric value for Population Density

Methods:
- CalDen()  # Method to calculate Density as Pop/KM
- Record()  # Method to allow user to enter values
              Code,Name,Pop,KM and call CalDen() method
- See()     # Method to display all the data members
              also display a message "Highly Populated
              Area" if the Density is more than 12000.
```

    (d)  How do we implement abstract method in python ? Give an example for the same.  **2**

    (e)  What is the significance of super() method ? Give an example for the same.  **2**

3. (a) What will be the status of the following list after the First, Second and Third pass of the insertion sort method used for arranging the following elements in descending order ? **3**

   `22, 24, -64, 34, 80, 43`

   Note : Show the status of all the elements after each pass very clearly underlining the changes.

   (b) For a given list of values in descending order, write a method in python to search for a value with the help of Binary Search method. The method should return position of the value and should return -1 if the value not present in the list. **2**

   (c) Write Insert(Place) and Delete(Place) methods in python to add Place and Remove Place considering them to act as Insert and Delete operations of the data structure Queue. **4**

   (d) Write a method in python to find and display the prime 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**

   `22,11,/,14,10,-,+,5,-`

4. (a) Write a statement in Python to perform the following operations : **1**
   - To open a text file "BOOK.TXT" in read mode
   - To open a text file "BOOK.TXT" in write mode

   (b) Write a method in python to write multiple line of text contents into a text file mylife.txt line. **2**

   (c) Consider the following definition of class Staff, write a method in python to search and display the content in a pickled file staff.dat, where Staffcode is matching with **3** `'S0105'`.

```
class Staff:
    def_init_(self,S,SNM):
        self.Staffcode=S
        self.Name=SNM

    def Show(self):
        print(self.Staffcode," - ",self.Name)
```

91/1                                    12

**SECTION – C**

**(For all the Candidates)**

5. (a) Observe the following STUDENTS and EVENTS tables carefully and write the name of the RDBMS operation which will be used to produce the output as shown in LIST. Also, find the Degree and Cardinality of the  LIST. **2**

**STUDENTS**

| NO | NAME |
|----|------|
| 1 | Tara Mani |
| 2 | Jaya Sarkar |
| 3 | Tarini Trikha |

**EVENTS**

| EVENTCODE | EVENTNAME |
|-----------|-----------|
| 1001 | Programming |
| 1002 | IT Quiz |

**LIST**

| NO | NAME | EVENTCODE | EVENTNAME |
|----|------|-----------|-----------|
| 1 | Tara Mani | 1001 | Programming |
| 1 | Tara Mani | 1002 | IT Quiz |
| 2 | Jaya Sarkar | 1001 | Programming |
| 2 | Jaya Sarkar | 1002 | IT Quiz |
| 3 | Tarini Trikha | 1001 | Programming |
| 3 | Tarini Trikha | 1002 | IT Quiz |

(b) Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables. **6**

**Table : VEHICLE**

| CODE | VTYPE | PERKM |
|------|-------|-------|
| 101 | VOLVO BUS | 160 |
| 102 | AC DELUXE BUS | 150 |
| 103 | ORDINARY BUS | 90 |
| 105 | SUV | 40 |
| 104 | CAR | 20 |

**Note :**
- PERKM is Freight Charges per kilometer
- VTYPE is Vehicle Type

**Table : TRAVEL**

| NO | NAME | TDATE | KM | CODE | NOP |
|-----|------|-------|-----|------|-----|
| 101 | Janish Kin | 2015–11–13 | 200 | 101 | 32 |
| 103 | Vedika Sahai | 2016–04–21 | 100 | 103 | 45 |
| 105 | Tarun Ram | 2016–03–23 | 350 | 102 | 42 |
| 102 | John Fen | 2016–02–13 | 90 | 102 | 40 |
| 107 | Ahmed Khan | 2015–01–10 | 75 | 104 | 2 |
| 104 | Raveena | 2016–05–28 | 80 | 105 | 4 |
| 106 | Kripal Anya | 2016–02–06 | 200 | 101 | 25 |

**Note :**
- NO is Traveller Number
- KM is Kilometer travelled
- NOP is number of travellers travelled in vehicle
- TDATE is Travel Date

**91/1**
**[P.T.O.**

(i)   To display NO, NAME, TDATE from the table TRAVEL in descending order of NO.

(ii)  To display the NAME of all the travellers from the table TRAVEL who are travelling by vehicle with code 101 or 102.

(iii) To display the NO and NAME of those travellers from the table TRAVEL who travelled between '2015-12-31' and '2015-04-01'.

(iv)  To display all the details from table TRAVEL for the travellers, who have travelled distance more than 100 KM in ascending order of NOP.

(v)   **SELECT COUNT (*), CODE FROM TRAVEL**
      **GROUP BY CODE HAVING COUNT(*)>1;**

(vi)  **SELECT DISTINCT CODE FROM TRAVEL;**

(vii) **SELECT A.CODE,NAME,VTYPE**
      **FROM TRAVEL A,VEHICLE B**
      **WHERE A.CODE=B.CODE AND KM<90;**

(viii) **SELECT NAME,KM*PERKM**
      **FROM TRAVEL A, VEHICLE B**
      **WHERE A.CODE=B.CODE AND A.CODE='105';**

6.  (a)  Verify the following using Boolean Laws :                                              **2**
    **A'+ B'.C=A'.B'.C'+ A'.B.C'+ A'.B.C + A'.B'.C+ A.B'.C**

    (b)  Write the Boolean Expression for the result of the Logic Circuit as shown below :   **2**
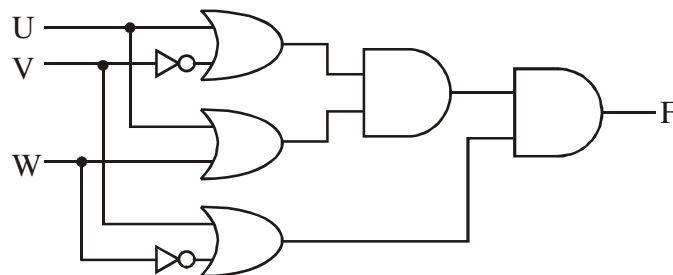


    (c)  Derive a Canonical POS expression for a Boolean function F, represented by the following truth table :                                              **1**

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

    (d)  Reduce the following Boolean Expression to its simplest form using K-Map :   **3**
    **F(X,Y,Z,W) = Σ(2,6,7,8,9,10,11,13,14,15)**

91/1                                              14

7. (a) Give two examples of PAN and LAN type of networks. **1**

(b) Which protocol helps us to browse through web pages using internet browsers ? Name any one internet browser. **1**

(c) Write two advantages of 4G over 3G Mobile Telecommunication Technologies in terms of speed and services. **1**

(d) Write two characteristics of Web 2.0. **1**

(e) What is the basic difference between Trojan Horse and Computer Worm ? **1**

(f) Categorise the following under Client Side and Server Side script category : **1**

    (i) VB Script

    (ii) ASP

    (iii) JSP

    (iv) JavaScript

(g) Uplifting Skills Hub India is a knowledge and skill community which has an aim to uplift the standard of knowledge and skills in the society. It is planning to setup its training centers in multiple towns and villages pan India with its head offices in the nearest cities. They have created a model of their network with a city, a town and 3 villages as follows.

As a network consultant, you have to suggest the best network related solutions for their issues/problems raised in (i) to (iv) keeping in mind the distances between various locations and other given parameters.
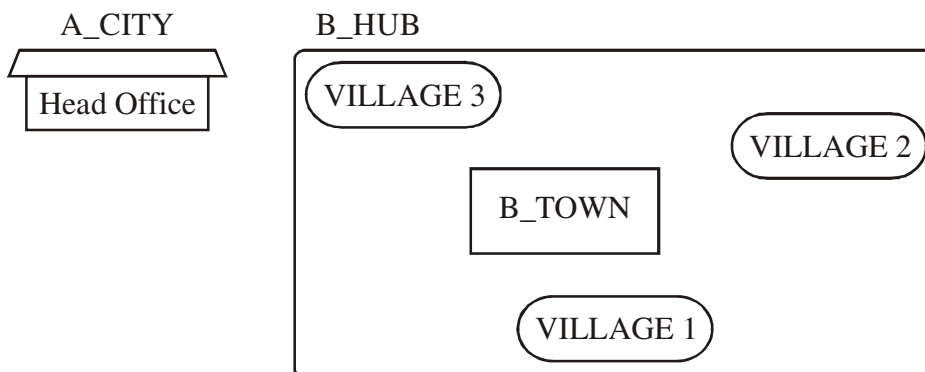
Shortest distances between various locations :

| VILLAGE 1 to B_TOWN | 2 KM |
|---|---|
| VILLAGE 2 to B_TOWN | 1.0 KM |
| VILLAGE 3 to B_TOWN | 1.5 KM |
| VILLAGE 1 to VILLAGE 2 | 3.5 KM |
| VILLAGE 1 to VILLAGE 3 | 4.5 KM |
| VILLAGE 2 to VILLAGE 3 | 2.5 KM |
| A_CITY Head Office to B_HUB | 25 KM |

Number of Computers installed at various locations are as follows :

| B_TOWN | 120 |
|---|---|
| VILLAGE 1 | 15 |
| VILLAGE 2 | 10 |
| VLLAGE 3 | 15 |
| A_CITY OFFICE | 6 |

**Note :**

- In Villages, there are community centers, in which one room has been given as training center to this organization to install computers.

- The organization has got financial support from the government and top IT companies.

(i) Suggest the most appropriate location of the SERVER in the B_HUB (out of the 4 locations), to get the best and effective connectivity. Justify your answer. **1**

(ii) Suggest the best wired medium and draw the cable layout (location to location) to efficiently connect various locations within the B_HUB. **1**

(iii) Which hardware device will you suggest to connect all the computers within each location of B_HUB ? **1**

(iv) Which service/protocol will be most helpful to conduct live interactions of Experts from Head Office and people at all locations of B_HUB ? **1**

91/1 16