SET – 4

Series : SSO/1

Code No. 91/1

Roll No. | | | | | | | |

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 **11** 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***

General Instructions :

(i) ***All** questions are compulsory.*

(ii) *Programming Language : Section **A** refers to C++*

(iii) *Programming Language : Section **B** refers to Python.*

(iv) *Attempt either Section **A** or Section **B**.*

(v) *Section **C** is compulsory for **all**.*

(vi) *It is compulsory to mention 'Section **A**' or 'Section **B**' before attempting the question paper.*

Section – A

(Only for C++ Candidates)

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**

```
While, for, Float, new, 2ndName, A%B, Amount2, _Counter
```

(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 TEXT[80];
void main()
{
    TEXT Str[] = "Peace is supreme";
    int Index=0;
    while (Str[Index]!='\0')
        if (isupper(Str[Index]))
            Str[Index++]='#';
        else
            Str[Index++]='*';
    puts(Str);
}
```

(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 Max=70.0;
Void main()
{
    int Speed
    char Stop='N';
    cin>>Speed;
    if Speed>Max
        Stop='Y';
    cout<<Stop<<end;
}
```

(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 Position(int &C1,int C2=3)
{
    C1+=2;
    C2+=Y;
}
void main()
{
    int P1=20, P2=4;
    Position(P1);
    cout<<P1<<","<<P2<<end1;
    Position(P2,P1);
    cout<<P1<<","<<P2<<end1;
}
```

(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 Calc
{
    char Grade;
    int Bonus;
public:
    Calc() {Grade='E';Bonus=0;}
    void Down(int G)
    {
        Grade-=G;
    }
    Void Up(int G)
    {
        Grade+=G;
        Bonus++;
    }
    void Show()
    {
        cout<<Grade<<"#"<<Bonus<<end1;
    }
};
void main()
{
    Calc c;
    C.Down(2);
    C.Show();
    C.Up(7);
    C.Show();
    C.Down(2);
    C.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 NUM. **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 NUM;
     NUM=random(3)+2;
     char TEXT[]="ABCDEFGHIJK";
     for (int I=1;I<=NUM; I++)
     {
          for(int J=NUM; J<=7;J++)
              cout<<TEXT[J];
          cout<<end1;
     }
}
```

(i)
```
FGHI
FGHI
FGHI
FGHI
```

(ii)
```
BCDEFGH
BCDEFGH
```

(iii)
```
EFGH
EFGH
EFGH
EFGH
```

(iv)
```
CDEFGH
CDEFGH
```

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 Traveller
{
     long PNR;
     char TName[20];
public :
     Traveller()                              //Function 1
     {cout<<"Ready"<<end1;}

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

     void Print()                             //Function 3
     {cout<<PNR << TName <<end1;}

     ~Traveller()                             //Function 4
     {cout<<"Booking cancelled!"<<end1;}
};
```

(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()
{
    Traveller T;
    _________                    //Line 1
    _________                    //Line 2
}//Stops here
```

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

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

Private Members

- **Pno** **//Data member for Picture Number (an integer)**
- **Category** **//Data member for Picture Category (a string)**
- **Location** **//Data member for Exhibition Location (a string)**
- **FixLocation** **//A member function to assign //Exhibition Location as per category //as shown in the following table**

Category	Location
Classic	Amina
Modern	Jim Plaq
Antique	Ustad Khan

Public Members

- **Enter()** **//A function to allow user to enter values //Pno, category and call FixLocation() function**
- **SeeAll()** **//A function to display all the data members**

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

```
class Exterior
{
   int OrderId;
   char Address[20];
protected:
   float Advance;
```

```
public:
   Exterior();
   void Book(); void View();
};
class Paint:public Exterior
{
   int WallArea,ColorCode;
protected:
   char Type;
public:
   Paint();
   void PBook();
   void PView();
};
class Bill : public Paint
{
   float Charges;
   void Calculate();
public :
   Bill();
   void Billing();
   void Print();
};
```

(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 Paint.

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

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

3. (a) Write the definition of a function Alter(int A[], int N) in C++, which should change all the multiples of 5 in the array to 5 and rest of the elements as 0. For example, if an array of 10 integers is as follows : **2**

A[0]	A[1]	A[2]	A[3]	A[4]	A[5]	A[6]	A[7]	A[8]	A[9]
55	43	20	16	39	90	83	40	48	25

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

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

(b) A two dimensional array P[20] [50] is stored in the memory along the row with each of its element occupying 4 bytes, find the address of the element P[10] [30], if the element P[5] [5] is stored at the memory location 15000. **3**

(c) Write the definition of a member function Pop( ) in C++, to delete a book from a dynamic stack of TEXTBOOKS considering the following code is already included in the program. **4**

```
struct TEXTBOOKS
{
   char ISBN[20]; char TITLE[80];
   TEXTBOOKS *Link;
};
class STACK
{
   TEXTBOOKS *Top;
public:
   STACK(){Top=NULL;}
   void Push();
   void Pop();
   ~STACK();
};
```

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

Note : Array may contain any number of rows.

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 :

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

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

X / Y + U* (V–W)

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

Note :

– The word STORY should be an independent word

– Ignore type cases (i.e. lower/upper case)

Example :

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

```
Success shows others that we can do it. It is possible to
achieve success with hard work. Lot of money does not mean
SUCCESS.
```

The function SUCCESS( ) should display the following :

```
3
```

(b) Write a definition for function Economic ( ) in C++ to read each record of a binary file ITEMS.DAT, find and display those items, which costs less than 2500. Assume that the file ITEMS.DAT is created with the help of objects of class ITEMS, which is defined below : **3**

```
class ITEMS
{
    int ID;char GIFT[20]; float Cost;
public :
    void Get()
    {
        cin>>CODE;gets(GIFT);cin>>Cost;
    }
    void See()
    {
        cout<<ID<<":"<<GIFT<<":"<<Cost<<end1;
    }
    float GetCost(){return Cost;}.
};
```

(c) Find the output of the following C++ code considering that the binary file CLIENTS.DAT exists on the hard disk with records of 100 members. **1**

```
class CLIENTS
{
    int Cno;char Name[20];
public :
    void In(); void Out();
};
void main()
{
    fstream CF;
    CF.open("CLIENTS.DAT",ios::binary|ios::in);
    CLIENTS C;
    CF.read((char*) &C, sizeof(C));
    CF.read((char*) &C, sizeof(C));
    CF.read((char*) &C, sizeof(C));
    int POS=CF.tellg()/sizeof(C);
    cout<<"PRESENT RECORD:"<<POS<<end1;
    CF.close();
}
```

Section – B
(Only for Python Candidates)

1. (a) How is _init( ) _different from _del ( ) __ ? **2**

(b) Name the function/method required to **1**

(i) check if a string contains only uppercase letters

(ii) gives 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 Tot(Number)  #Method to find Total
    Sum=0
    for C in Range (1, Number+1):
        Sum+=C
    RETURN Sum
print Tot[3]       #Function Calls
print Tot[6]
```

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

```
for Name in ['Jayes', 'Ramya', 'Taruna', 'Suraj']:
    print Name
    if Name[0]== 'T':
        break
else :
    print 'Finished!'
print 'Got it!'
```

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

```
class Worker :
    def_init_(self,id,name) :    #constructor
        self.ID=id
        self.NAME=name
    def Change(self):
        self.ID=self.ID+10
        self.NAME='Harish'
    def Display(self,ROW):
        print self.ID,self.NAME,ROW
w=Worker(55,'Fardeen')
w.Display(1)
w.Change()
w.Display(2)
print w.ID+len(w.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 NUMBER. **2**

```
STRING="CBSEONLINE"
NUMBER=random.randint(0,3)
N=9
while STRING[N]!='L':
    print STRING[N]+STRING[NUMBER]+'#',
    NUMBER=NUMBER+1
    N=N-1
```

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

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**

```
U=0
V=6
print 'First'
try:
    print 'Second'
    M=V/U
    print 'Third',M
    except ZeroDivisionError :
        print V*3
        print 'Fourth'
    except:
        print V*4
        print 'Fifth'
```

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

Instance Attributes

- `Pno  # Numeric value`
- `Category  # String value`
- `Location  # Exhibition Location with String value`

Methods :

- `FixLocation()  # A method to assign`
  `# Exhibition Location as per Category`
  `# as shown in the following table`

Category	Location
Classic	Amina
Modern	Jim Plaq
Antique	Ustad Khan

- `Enter()  # A function to allow user to enter values`
  `# Pno, Category and call FixLocation() method`
- `SeeAll()  # 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 thrice 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 :

ThisList=['41','DROND','GIRIRAJ', '13','ZARA']

The output should be

```
414141
DROND#
GIRIRAJ#
131313
ZARA#
```

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**

```
14, 10, -12, 9, 15, 35
```

(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 (Books) and POP (Books) methods in python to add Books and remove Books considering them to act as Push and Pop operations of Stack. **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**

```
84, 62, -, 14, 3, *, +
```

4. (a) Differentiate between the following : **1**

(i) `f = open('diary.txt', 'r')`

(ii) `f = open('diary.txt', 'w')`

(b) Write a method in python to read the content from a text file diary.txt line by line and display the same on screen. **2**

(c) Consider the following definition of class Member, write a method in python to write the content in a pickled file member.dat. **3**

```
class Member:
    def_init_(self,Mno,N):
        self.Memno=Mno
        self.Name=N

    def Show(self):
        Display(self.Memno,"#",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**

Id	Product	Qty	Price	Transaction Date
101	Plastic Folder 12"	100	3400	2014-12-14
104	Pen Stand Standard	200	4500	2015-01-31
105	Stapler Medium	250	1200	2015-02-28
109	Punching Machine Big	200	1400	2015-03-12
103	Stapler Mini	100	1500	2015-02-02

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

Table : DEPT

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

Table : WORKER

WNO	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 workers.

(i) To display Wno, Name, Gender from the table WORKER in descending order of Wno.

(ii) To display the Name of all the FEMALE workers from the table WORKER.

(iii) To display the Wno and Name of those workers from the table WORKER who are born between '1987-01-01' and '1991-12-01'.

(iv) To count and display MALE workers who have joined after '1986-01-01'.

(v)
```
SELECT COUNT(*), DCODE FROM WORKER
GROUP BY DCODE HAVING COUNT(*)>1;
```

(vi)
```
SELECT DISTINCT DEPARTMENT FROM DEPT;
```

(vii)
```
SELECT NAME, DEPARTMENT, CITY FROM WORKER W,DEPT D WHERE
W.DCODE=D.DCODE AND WNO<1003;
```

(viii)
```
SELECT MAX(DOJ), MIN(DOB) FROM WORKER;
```

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

`X + Y' = X.Y+X.Y'+X'.Y'`

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

`(U + V').W' + Z`

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

A	B	C	F(A,B,C)
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**

$F(X,Y,Z,W) = \Sigma(0,1,6,8,9,10,11,12,15)$

7. (a) Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks. **1**

(b) What is a spam mail ? **1**

(c) Differentiate between ftp and http. **1**

(d) Out of the following, which is the fastest (i) wired and (ii) wireless medium of communication ?

Infrared, Coaxial Cable, Ethernet Cable, Microwave, Optical Fiber **1**

(e) What is Worm ? How is it removed ? **1**

(f) Out of the following, which all comes under cyber crime ? **1**

(i) Stealing away a brand new computer from a showroom.

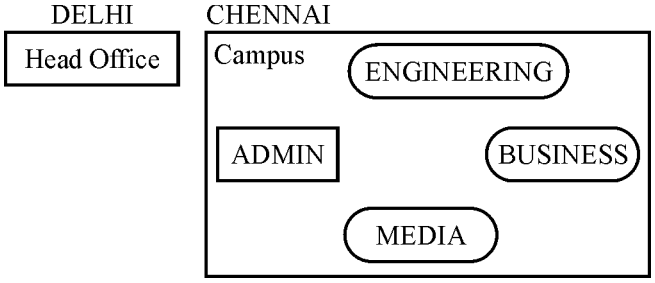
(ii) Getting in someone's social networking account without his consent and posting pictures on his behalf to harass him.

(iii) Secretly copying files from server of a call center and selling it to the other organization.

(iv) Viewing sites on a internet browser.

(g) Perfect Edu Services Ltd. is an educational organization. It is planning to setup its India campus at Chennai with its head office at Delhi. The Chennai campus has 4 main buildings – ADMIN, ENGINEERING, BUSINESS and MEDIA.

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 ENGINEERING	55 m
ADMIN to BUSINESS	90 m
ADMIN to MEDIA	50 m
ENGINEERING to BUSINESS	55 m
ENGINEERING to MEDIA	50 m
BUSINESS to MEDIA	45 m
DELHI Head Office to CHENNAI Campus	2175 km

Number of Computers installed at various buildings are as follows :

ADMIN	110
ENGINEERING	75
BUSINESS	40
MEDIA	12
DELHI Head Office	20

(i) Suggest the most appropriate location of the server inside the CHENNAI campus (out of the 4 buildings), to get the best connectivity for maximum no. of computers. Justify your answer. **1**

(ii) Suggest and draw the cable layout to efficiently connect various buildings within the CHENNAI 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 CHENNAI campus and DELHI Head Office ? **1**

(a) Cable TV

(b) Email

(c) Video Conferencing

(d) Text Chat

———————

CBSE AISSCE 2015 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91/1 Delhi)

General Instructions:

- **The answers given in the marking scheme are SUGGESTIVE, Examiners are requested to award marks for all alternative correct solutions/answers conveying similar meaning.**
- **All programming questions have to be answered with respect to C++ Language for Section A and Python for Section B (All presently supported versions of compilers/interpreters should be considered).**
- **In C++/Python, ignore case sensitivity for identifiers (Variable / Functions / Structures / Class Names) unless explicitly specified in question.**
- **In SQL related questions :**
  - **Both ways of text/character entries should be acceptable. For example: "AMAR" and 'amar' both are acceptable.**
  - **All date entries should be acceptable for example: 'YYYY-MM-DD', 'YY-MM-DD', 'DD-Mon-YY', "DD/MM/YY", 'DD/MM/YY', "MM/DD/YY", 'MM/DD/YY' and {MM/DD/YY} are correct.**
  - **Semicolon should be ignored for terminating the SQL statements.**
  - **Ignore case sensitivity for commands.**
  - **Ignore headers in output questions.**

			Section - A **(Only for C++ candidates)**	
1	(a)		Find the correct identifiers out of the following, which can be used for naming variable, constants or functions in a C++ program: **While, for, Float, new, 2ndName, A%B, Amount2, _Counter**	2
	Ans		`While, Float, Amount2, _Counter`	
			(½ Mark for each correct identifier) ***Note:*** ● ***Deduct ½ Mark for writing additional incorrect identifier(s)*** ● ***No marks to be awarded if all the identifiers are mentioned***	

	(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:
			
			`typedef char TEXT[80];`
			`void main()`
			`{`
			`  TEXT Str[] = "Peace is supreme";`
				1

			`int Index=0;`
			`while (Str[Index]!='\0')`
			`if (isupper(Str[Index]))`
			`Str[Index++]='#';`
			`else`
			`Str[Index++]='*';`
			`puts(str);`
			`}`	

	Ans		`ctype, stdio`	
			(½ Mark for each correct header file) *Note:* *Ignore any additional header file(s)*	

	(c)		**Observe the following C++ code very carefully and rewrite it after removing any/all syntactical errors with each correction underlined.**
			Note: Assume all required header files are already being included in the program.
			
			`#Define float Max=70.0;`
			`Void main()`
			`{`
			`int Speed`
			`char Stop='N';`
			`cin>>Speed;`
			`if Speed>Max`
			`Stop='Y';`
			`cout<<Stop<<end;`
			`}`
				2

	Ans		`#define Max 70.0` //Error 1,2,3
			`void main()` //Error 4
			`{`
			
			`int Speed;` //Error 5
			`char Stop='N';`
			`cin>>Speed;`
			`if (Speed>Max)` //Error 6
			`Stop='Y';`
			`cout<<Stop<<endl;` //Error 7
			`}`	

			(½ Mark for each correction upto a maximum of 4 corrections) *OR* *(1 Mark for only identifying any 4 errors, without suggesting corrections)*	

	(d)		Write the output of the following C++ program code:
			Note: Assume all required header files are already being included in the program.
			`void Position (int &C1, int C2=3)`
			`{`
			`  C1+=2;`
			`  C2+=Y;`
			`}`
			`void main()`
			`{`
			`  int P1=20, P2=4;`
			`  Position(P1);`
			`  cout<<P1<<",”<<P2<<endl;`
			`  Position(P2,P1);`
			`  cout<<P1<<",”<<P2<<endl;`
			`}`
				2

	Ans		`22,4`
			`22,6`
			
			(½ Mark for each correct value of output)
			Note:
			● Deduct ½ *Mark for not considering any or all endl(s) at proper place(s)*
			● Deduct ½ *Mark for not considering any or all ‘,’ at proper place(s)*
			OR
			(Full 2 marks to be awarded for mentioning Syntax Error OR undeclared variable Y)	

	(e)		**Write the output of the following C++ program code:**
			Note: Assume all the required header files are already being included in the program.
			`class Calc`
			`{`
			`  char Grade;`
			`  int Bonus;`
			`public:`
			`  Calc(){Grade='E' ; Bonus=0;}`
			`  void Down(int G)`
				3

			`{`
			`  Grade-=G;`
			`}`
			`Void Up(int G)`
			`{`
			`  Grade+=G;`
			`  Bonus++;`
			`}`
			`void Show()`
			`{`
			`  cout<<Grade<<"#"<<Bonus<<end1;`
			`}`
			`};`
			
			`void main()`
			`{`
			`  Calc c;`
			`  C.Down(2);`
			`  C.Show();`
			`  C.Up(7);`
			`  C.Show();`
			`  C.Down(2)`
			`  C.Show();`
			`}`	

	Ans		`C#0`
			`J#1`
			`H#1`	

			(1 Mark for each correct line of output) **Note:** ● **Deduct ½** *Mark for not considering any or all endl(s) at proper place(s)* ● **Deduct ½** *Mark for not writing any or all # symbol(s)* *OR* *(Full 3 marks to be awarded if undeclared object C OR ERROR is identified)*	
	(f)		**Study the following program and select the possible output(s)from the option (i) to (iv) following it. Also write the maximum and the minimum values that can be assigned to the variable NUM.** **Note:**	2

			- 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 NUM;** **NUM=random(3)+2;** **char TEXT[]="ABCDEFGHIJK";** **for (int I=1;I<=NUM; I++)** **{** **for (int J=NUM;J<=7;J++)** **cout<<TEXT[J];** **cout<<end1;** **}** **}** **(i) FGHI (ii) BCDEFGH (iii) EFGH (iv) CDEFGH** **FGHI BCDEFGH EFGH CDEFGH** **FGHI EFGH** **FGHI EFGH**	
	Ans		**(iii) and (iv)** — Minimum value of NUM = 2 Maximum value of NUM = 4	
			(½ Mark for writing option (iii)) ***(½ Mark for writing option (iv))*** ***Note: Deduct ½ mark for writing each additional option along with both correct options*** ***(½ Mark for writing correct Minimum value of NUM)*** ***(½ Mark for writing correct Maximum value of NUM)***	
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
	Ans		**A copy constructor is an overloaded constructor in which an object of the same class is passed as reference parameter.** **class Point** **{** **int x;**	

			public:
			Point(){x=0;}
			Point(Point &p) // Copy constructor
			{x = p.x;}
			:
			};
			void main()
			{
			Point p1;
			Point p2(p1);//Copy constructor is called here
			//OR
			Point p3=p1;//Copy constructor is called here
			}	

			(1½ Mark to be awarded if the copy constructor is explained with an appropriate example) **OR** ***(1 Mark for correct explanation of copy constructor only without an example)*** ***(½ Mark for correct declaration of an object)***	

	(b)		Observe the following C++ code and answer the questions (i) and (ii) :
			class Traveller
			{
			long PNR;
			char TName[20];
			public :
			Traveller() //Function 1
			{cout<<"Ready"<<endl;}
			void Book(long P,char N[]) //Function 2
			{PNR = P; strcpy(TName, N);}
			void Print() //Function 3
			{cout<<PNR << TName <<endl;}
			~Traveller() //Function 4
			{cout<<"Booking cancelled!"<<endl;}
			};
				2

			(i) Fill in the blank statements in Line 1 and Line 2 to execute Function 2 and Function 3 respectively in the following code: **void main{)** **{** **Traveller T;** **_____ //Line 1**	**1**

			`_____ //Line 2` `}//Stops here`	

	Ans		`T.Book(1234567,"Ravi");  //Line 1`
			`T.Print();  //Line 2`	

			(½ Mark for writing each correct Function)	
			(ii) Which function will be executed at }//Stops here? What is this function referred as ?	1

	Ans		`Function 4`
			`OR`
			`~Traveller()`
			
			It is a Destructor function.	

			(½ Mark for writing Function 4 or ~Traveller()) *(½ Mark for referring Destructor)*	

	(c)		Write the definition of a class PlC in C++ with following description:
			Private Members
			`-Pno  //Data member for Picture Number (an integer)`
			`-Category//Data member for Picture Category (a string)`
			`-Location//Data member for Exhibition Location (a string)`
			`- FixLocation //A member function to assign`
			`//Exhibition Location as per category`
			`//as shown in the following table`
			
			`Public Members`
			`-Enter()//A function to allow user to enter values`
			`//Pno,category and call FixLocation() function`
			`-SeeAll()//A function to display all the data members`
				4

	Ans		`class PIC`
			`{`
			`int Pno;`
			`char Category[20];`
			`char Location[20];`
			`void FixLocation();`
			`public:`
			`void Enter();`	

Category	Location
Classic	Amina
Modern	Jim Plaq
Antique	Ustad Khan

			`void SeeAll();`
			`};`
			`void PIC::FixLocation()`
			`{`
			`if(strcmpi(Category,"Classic")==0)`
			`strcpy(Location,"Amina");`
			`else if(strcmpi(Category,"Modern")==0)`
			`strcpy(Location,"Jim Plaq");`
			`else if strcmpi(Category,"Antique")==0)`
			`strcpy(Location,"Ustad Khan");`
			`}`
			`void PIC::Enter()`
			`{`
			`cin>>Pno;gets(Category);`
			`FixLocation();`
			`}`
			`void PIC:: SeeAll()`
			`{`
			`cout<<Pno<<Category<<Location<<endl;`
			`}`	

			(½ Mark for correct syntax for class header) *(½ Mark for correct declaration of data members)* *(1 Mark for correct definition of FixLocation())* *(1 Mark for correct definition of Enter() with proper invocation of FixLocation() function)* *(1 Mark for correct definition of SeeAll())* *NOTE:* ● *Deduct ½ Mark if FixLocation() is not invoked properly inside Enter() function* ● *No marks to be deducted for defining Member Functions inside the class* ● *strcmp()/strcmpi() acceptable*	

	(d)		Answer the question (i) to (iv) based on the following:
			`class Exterior`
			`{`
			`int OrderId;`
			`char Address[20];`
			`protected:`
			`float Advance;`
			`public:`
			`Exterior();`
			`void Book(); void View();`
			`};`
				4

			`class Paint:public Exterior`
			`{`
			`  int WallArea,ColorCode;`
			`protected:`
			`  char Type;`
			`public:`
			`  Paint() ;`
			`  void PBook();`
			`  void PView();`
			`};`
			`class Bill:public Paint`
			`{`
			`  float Charges;`
			`  void Calculate();`
			`public:`
			`  Bill() ;`
			`  void Billing() ;`
			`  void Print() ;`
			`};`	

			(i) Which type of Inheritance out of the following is illustrated in the above example? -Single Level Inheritance -Multi Level Inheritance -Multiple Inheritance	
	Ans		**Multi Level Inheritance**	
			(1 Mark for mentioning correct option)	
			(ii) Write the names of all the data members, which are directly accessible from the member functions of class Paint.	
	Ans		**WallArea, ColorCode,Type, Advance**	
			(1 Mark for correct answer) ***Note: No marks to be awarded for any partial/additional answer(s)***	
			(iii) Write the names of all the member functions, which are directly accessible from an object of class Bill.	
	Ans		**Billing(), Print(), PBook(), PView(), Book(), View()**	
			(1 Mark for correct answer) ***Note:***	

<table>
<tr><td></td><td></td><td></td><td>

- *No marks to be awarded for any partial/additional answer(s)*
- *Constructors can be ignored*

</td><td></td></tr>
<tr><td></td><td></td><td></td><td>(iv) What will be the order of execution of the constructors, when an object of class Bill is declared?</td><td></td></tr>
<tr><td></td><td>Ans</td><td></td><td>Exterior(), Paint(), Bill()</td><td></td></tr>
<tr><td></td><td></td><td></td><td>(1 Mark for correct answer)
Note: No marks to be awarded for any other order</td><td></td></tr>
<tr><td>3</td><td>(a)</td><td></td><td>Write the definition of a function Alter(int A[], int N) in C++, which should change all the multiples of 5 in the array to 5 and rest of the elements as 0. For example, if an array of 10 integers is as follows:
<table>
<tr><td>A[0]</td><td>A[1]</td><td>A[2]</td><td>A[3]</td><td>A[4]</td><td>A[5]</td><td>A[6]</td><td>A[7]</td><td>A[8]</td><td>A[9]</td></tr>
<tr><td>55</td><td>43</td><td>20</td><td>16</td><td>39</td><td>90</td><td>83</td><td>40</td><td>48</td><td>25</td></tr>
</table>
After executing the function, the array content should be changed as follow:
<table>
<tr><td>A[0]</td><td>A[1]</td><td>A[2]</td><td>A[3]</td><td>A[4]</td><td>A[5]</td><td>A[6]</td><td>A[7]</td><td>A[8]</td><td>A[9]</td></tr>
<tr><td>5</td><td>0</td><td>5</td><td>0</td><td>0</td><td>5</td><td>0</td><td>5</td><td>0</td><td>5</td></tr>
</table>
</td><td>2</td></tr>
<tr><td></td><td>Ans</td><td></td><td>

```
void Alter(int A[ ],int N)
{
  for (int i=0;i<N;i++)
       if(A[i]%5==0)
           A[i]=5;
       else
           A[i]=0;
}
```

OR
Any other correct equivalent function definition</td><td></td></tr>
<tr><td></td><td></td><td></td><td>(½ Mark for correct loop)
(½ Mark for correct checking of divisibility of array elements by 5)
(½ Mark for correct use of else OR correct checking of non divisibility of array elements by 5)
(½ Mark for correct assignment of 5 and 0 for multiples and non multiples of 5 respectively)</td><td></td></tr>
</table>

	(b)		A two dimensional array P[20] [50] is stored in the memory along the row with each of its element occupying 4 bytes, find the address of the element P[10] [30],if the element P[5] [5] is stored at the memory location 15000.	3
	Ans		**Loc(P[I][J]) along the row** **=BaseAddress+W [(I-LBR)*C+(J-LBC)]** **(where C is the number of columns, LBR=LBC=0)** **LOC(P[5][5])** **= BaseAddress + W*[I*C + J]** **15000 = BaseAddress + 4*[5*50 + 5]** **= BaseAddress + 4*[250 + 5]** **= BaseAddress + 4*255** **= BaseAddress + 1020** **BaseAddress = 15000-1020 = 13980** **LOC(P[10][30])= 13980 + 4*[10*50+30]** **= 13980 + 4*530** **= 13980 + 2120** **= 16100** **OR** **LOC(P[10][30])** **= Loc(P[5][5])+ W[(I-LBR)*C+(J-LBC)]** **= 15000 + 4[(10-5)*50 + (30-5)]** **= 15000 + 4[5*50 + 25]** **= 15000 + 4 *275** **= 15000 + 1100** **= 16100** **OR** **(Where C is the number of columns and LBR=LBC=1)** **LOC(P[5][5])** **15000 = BaseAddress + W [(I-1)*C + (J-1)]** **= BaseAddress + 4[4*50 + 4]** **= BaseAddress + 4[200 + 4]** **= BaseAddress + 4 * 204** **= BaseAddress + 816** **BaseAddress = 15000 - 816 = 14184** **LOC(P[10][30])** **= 14184 + 4[(10-1)*50 + (30-1)]** **= 14184 + 4[9*50 + 29]** **= 14184 + 4[450 + 29]** **= 14184 + 4*479** **= 14184 + 1916** **= 16100**	

			(1 Mark for writing correct formula (for row major) OR substituting formula with correct values) *(1 Mark for at least one step of intermediate calculation)* *(1 Mark for final correct address)*	

	(c)		Write the definition of a member function Pop() in C++, to delete a book from a dynamic stack of TEXTBOOKS considering the following code is already included in the program.
			`struct TEXTBOOKS`
			`{`
			`  char ISBN[20]; char TITLE[80];`
			`  TEXTBOOKS *Link;`
			`};`
			`class STACK`
			`{`
			`  TEXTBOOKS *Top;`
			`public:`
			`  STACK() {Top=NULL;}`
			`  void Push();`
			`  void Pop();`
			`  ~STACK();`
			`};`
				4

	Ans		`void STACK::POP()`
			`{`
			`  if (Top!=NULL)`
			`  {`
			`  TEXTBOOKS *Temp;`
			`  Temp=Top;`
			`  cout<<Top->ISBN<<Top->TITLE<<"deleted"<<endl;`
			`  Top=Top->Link;`
			`  delete Temp;`
			`  }`
			`  else`
			`  cout<<"Stack Empty"<<endl;`
			`}`
			OR
			Any other correct equivalent function definition	

			(1 Mark for checking Empty/Non-empty STACK) *(1 Mark for assigning Top to Temp)* *(1 Mark for linking the Top to next node)* *(1 Mark for deleting Temp node)*	

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

Note: Array may contain any number of rows.

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:

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

Ans

```
void REVCOL(int P[][5],int N,int M)
{
  for(int I=N-1;I>=0;I--)
  {
    for(int J=0;J<M;J++)
      cout<<P[I][J];
    cout<<endl;
  }
}
```

OR

```
void REVCOL(int P[][5],int N,int M)
{
   for(int I=0;I<N/2;I++)
   {
     for(int J=0;J<M;J++)
     {
       int T = P[I][J];
       P[I][J] = P[N-I-1][J];
       P[N-I-1][J] = T;
     }
   }
   for(I=0;I<N;I++)
   {
     for(int J=0;J<M;J++)
       cout<<P[I][J];
     cout<<endl;
   }
}
```

(1 Mark for correct nesting of loop(s))

(1½ Mark for correct logic for reversing the content of each

column)
(½ Mark for correctly displaying the content)

Note:

- *N and M can be written interchangeably for number of rows and columns*

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

X / Y + U* (V-W)

Ans

X / Y + U* (V-W)=((X / Y)+(U*(V-W)))

Element	Stack	Postfix
(		
(		
X		X
/	/	X
Y	/	XY
)		XY/
+	+	XY/
(	+	XY/
U	+	XY/U
*	+*	XY/U
(	+*	XY/U
V	+*	XY/UV
-	+*-	XY/UV
W	+*-	XY/UVW
)	+*	XY/UVW-
)	+	XY/UVW-*
)		XY/UVW-*+

OR

Element	Stack	Postfix
X		X
/	/	X
Y	/	XY
+	+	XY/
U	+	XY/U

*	+*	XY/U
(	+*(	XY/U
V	+*(	XY/UV
-	+*(-	XY/UV
W	+*(-	XY/UVW
)	+*	XY/UVW-
	+	XY/UVW-*
		XY/UVW-*+

OR

Any other method for converting the given Infix expression to its equivalent Postfix expression showing stack contents

(½ Mark for converting expression up to each operator)

OR

(1 Mark to be given for writing correct answer without showing the Stack Content on each step)

4 (a) Write function definition for SUCCESS () in C++ to read the content of a text file STORY.TXT count the presence of world STORY and display the number of occurrence of this word. 2

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

Example:
If the content of the file Story.TXT is as follows:

```
Success shows others that we can do it. It is
possible to achieve success with hard work. Lot
of money does not mean SUCCESS.
```

The function SUCCESS () should display the following:

```
3
```

Ans

```
void SUCCESS()
{
 int count=0;
 ifstream f("STORY.TXT");
 char s[20];
 while (!f.eof())
 {
  f>>s;
```

```
  if(strcmpi(s,"STORY")==0)
//OR if(strcmpi(s,"SUCCESS")==0)
       count++;
 }
 cout<<count;
 f.close();
}
```

OR

Any other correct function definition

(½ Mark for opening STORY.TXT correctly)
(½ Mark for reading each word (using any method) from the file)
(½ Mark for comparing the word with STORY OR SUCCESS)
(½ Mark for displaying correct count of STORY OR SUCCESS)
NOTE:
(½ Mark to be deducted if STORY or SUCCESS is compared without ignoring the case)

(b) Write a definition for function Economic() in C++ to read each record of a binary file ITEMS.DAT, find and display those items, which costs less than 2500. Assume that the file ITEMS.DAT is created with the help of objects of class ITEMS, which is defined below: **3**

```
class ITEMS
{
    int ID;char GIFT[20]; float Cost;
public :
     void Get()
     {
     cin>>CODE;gets(GIFT);cin>>Cost;
     }
     void See()
     {
      cout<<ID<<":"<<GIFT<<":"<<Cost<<endl;
     }
     float GetCost() {return Cost;}.
};
```

Ans

```
void Economic()
{
    ITEMS I;
    ifstream fin("ITEMS.DAT",ios::binary);
```

```
    while (fin.read((char *)&I,sizeof(I)))
    {
        if(I.GetCost()<2500)
           I.See();
    }
    fin.close();
}
```

OR

Any other correct equivalent function definition

(½ Mark for opening ITEMS.DAT correctly)
(1 Mark for reading all records from the file)
(1 Mark for checking value of Cost < 2500)
(½ Mark for displaying the desired items)

(c) Find the output of the following C++ code considering that the binary file CLIENTS.DAT exists on the hard disk with records of 100 members. **1**

```
class CLIENTS
{
    int Cno;char Name[20];
public :
     void In(); void Out();
};
void main{)
{
 fstream CF;
 CF.open("CLIENTS.DAT",ios:: binary| ios::in) ;
 CLIENTS C;
 CF.read((char*)&C,sizeof(C));
 CF.read((char*)&C,sizeof(C));
 CF.read((char*)&C,sizeof(C));
 int POS=CF.tellg()/sizeof(C);
 cout<<"PRESENT RECORD:"<<POS<<endl;
 CF.close() ;
}
```

Ans

```
PRESENT RECORD: 3
```

(1 Mark for writing PRESENT RECORD: 3)
OR
(1 Mark for writing only 3)
OR
(½ Mark for writing only PRESENT RECORD:)

			Section - B **(Only for Python candidates)**	
1	(a)		How is _init( ) _different from _del ( ) _ ?	2

	Ans		**`__init__()`** is the class constructor or initialization method which is automatically invoked when we create a new instance of a class
			`__del__()` is a destructor which is automatically invoked when an object (instance) goes out of scope.
			For Example:
			`class Sample:`
			`  def __init__(self):`
			`  self.data = 79`
			`  print('Data:',self.data,'created')`
			`  def __del__(self):`
			`  print('Data:',self.data,'deleted')`
			`s = Sample()`
			`del s`	

			(2 Marks for correct differentiation) ***OR*** ***(2 Marks for differentiation through example)*** ***OR*** ***(1 Mark for each correct definition)***	
	(b)		Name the function/method required to (i) check if a string contains only uppercase letters (ii) gives the total length of the list.	1
	Ans		(i) isupper() (ii) len()	
			(½ Mark for each correct function/ method name)	

	(c)		**Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code.**
			`def Tot(Number) #Method to find Total`
			`  Sum=0`
			`  for C in Range (1, Number+1):`
			`  Sum+=C`
				2

			`RETURN Sum`
			
			`print Tot[3]  #Function Calls`
			`print Tot[6]`	

	Ans		`def Tot(Number): #Method to find Total  #Error 1`
			`  Sum=0`
			`  for C in range (1, Number+1):  #Error 2`
			`  Sum+=C`
			`  return Sum  #Error 3`
			
			`print Tot(3) #Function Call  #Error 4`
			`print Tot(6)  #Error 4`	

			(½ Mark for each correction) *OR* *(1 mark for identifying all the errors, without suggesting corrections)*	

	(d)		Find and write the output of the following python code :
			`for Name in ['Jayes', 'Ramya', 'Taruna','Suraj']:`
			`  print Name`
			`  if Name[0]== 'T':`
			`  break`
			`else :`
			`  print 'Finished!'`
			`print 'Got it!'`
				2

	Ans		`Jayes`
			`Ramya`
			`Taruna`
			`Got it!`	

			(½ Mark for each correct line) *Note:* Deduct ½ *Mark for not considering any or all line breaks at proper place(s)*	

	(e)		Find and write the output of the following python code:
			
			`class Worker :`
			`  def_init_(self,id,name):  #constructor`
			`  self.ID=id`
				3

			`self.NAME=name`
			`def Change (self) :`
			`self.ID=self.ID+10`
			`self.NAME='Harish'`
			
			`def Display(self,ROW) :`
			`print self.ID,self.NAME,ROW`
			
			`w=Worker(55,'Fardeen')`
			`w.Display(1)`
			`w.Change( )`
			`w.Display(2)`
			`print w.ID+len(w.NAME)`	

	Ans		`55 Fardeen 1`
			`65 Harish 2`
			`71`	

			(1 Mark for each correct line) *Note:* Deduct ½ *Mark for not considering any or all line break(s) at proper place(s).*	

	(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 NUMBER.
			`STRING="CBSEONLINE"`
			`NUMBER=random.randint(0,3)`
			`N=9`
			`while STRING[N]!='L':`
			`print STRING[N]+STRING[NUMBER]+'#',`
			`NUMBER=NUMBER + 1`
			`N=N-1`
			`(i) (ii) (iii) (iv)`
			`ES#NE#IO# LE#NO#ON# NS#IE#LO# EC#NB#IS#`
				2

	Ans		`(i) ES#NE#IO#`
			`(iv) EC#NB#IS#`
			`Minimum value of NUMBER = 0`
			`Maximum value of NUMBER = 3`	

			(½ Mark for writing option (i)) *(½ Mark for writing option (iv))*	

			Note: • *Deduct ½ mark for writing each <u>additional</u> option along with both correct options* *(½ Mark for writing correct Minimum value of NUMBER)* *(½ Mark for writing correct Maximum value of NUMBER)*	
2	**(a)**		**Illustrate the concept inheritance with the help of a python code**	2

	Ans		`class Base:`
			`  def __init__ (self):`
			`  print "Base Constructor at work..."`
			`  def show(self):`
			`  print "Hello Base"`
			
			`class Der(Base):`
			`  def __init__(self):`
			`  print "Derived Constructor at work..."`
			
			`  def display(self):`
			`  print "Hello from Derived"`	

			(1 Mark for base class) *(1 Mark for derived class)*	

	(b)		**What will be the output of the following python code ? Explain the try and except used in the code.**
			
			`U=0`
			`V=6`
			`print 'First'`
			`try:`
			`  print 'Second'`
			`  M=V/U`
			`  print 'Third',M`
			`  except ZeroDivisionError :`
			`  print V*3`
			`  print 'Fourth'`
			`  except:`
			`  print V*4`
			`  print 'Fifth'`
				2

	Ans		**First** **Second** **18** **Fourth** **The code written within try triggers the exception written after except ZeroDivisionError: in case there is a division by zero error otherwise the default exception is executed** **OR** **Any other correct explanation for usage of try and except**	
			(½ Mark for first two lines of correct output) ***(½ Mark for next two lines of correct output)*** ***(½ Mark each for correct explanation of try and except)***	
	(c)		**Write a class PICTURE in Python with following specifications:** **Instance Attributes** **- Pno # Numeric value** **- Category # String value** **- Location # Exhibition Location with String value** **Methods:** **- FixLocation ()# A method to assign Exhibition Location as per Category as shown in the following table**	4

Category	Location
Classic	Amina
Modern	Jim Plaq
Antique	Ustad Khan

- Enter() # A function to allow user to enter values
 # Pno, Category and call FixLocation() method
- SeeAll() # A function to display all the data members

	Ans		**class PICTURE:** **Pno=0** **Category=" "** **Location=" "** **def FixLocation():** **if self.Category=="Classic":** **self.Location="Amina"** **elif self.Category=="Modern":**	

			`self.Location="Jim Plaq"`
			`elif self.Category=="Antique":`
			`self.Location="Ustad Khan"`
			`def Enter():`
			`self.Pno=int(input("Enter Pno:"))`
			`self.Category=input("Enter Name:")`
			`self.FixLocation()`
			`def SeeAll()`
			`print self.Pno,self.Category,self.Location`	

			(½ Mark for correct syntax for class header) *(½ Mark for correct declaration of instance attributes)* *(1 Mark for correct definition of FixLocation())* *(1 Mark for correct definition of Enter() with proper invocation of FixLocation() method)* *(1 Mark for correct definition of SeeAll())* *NOTE:* *Deduct ½ Mark if FixLocation() is not invoked properly inside Enter() method*	
	(d)		**What is operator overloading with methods? Illustrate with the help of an example using a python code.**	2

	Ans		**Operator overloading is an ability to use an operator in more than one form.**
			Examples:
			In the following example operator + is used for finding the sum of two integers:
			`a = 7`
			`b = 5`
			`print(a+b)  # gives the output: 12`
			Whereas in the next example, shown below the same + operator is used to add two strings:
			`a = 'Indian '`
			`b = 'Government'`
			`print(a+b) #gives the output: Indian Government`	

			(1 Mark for correct definition of Operator overloading) *(1 Mark for correct example of Python code to illustrate Operator overloading)*	
	(e)		Write a method in python to display the elements of list thrice 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: ThisList=['41','DROND','GIRIRAJ','13','ZARA'] 414141 DROND# GIRlRAJ# 131313 ZARA#	

	Ans		def fun(L):
			  for I in L:
			  if I.isnumeric():
			  print(3*I) # equivalently: print(I+I+I)
			  else:
			  print(I+'#')	

			(½ Mark for correct loop) *(½ Mark for checking numeric/non numeric)* *(½ Mark for displaying numeric content)* *(½ Mark for displaying numeric content)*	
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 ? 14, 10, -12, 9, 15, 35	3
	Ans		Bubble Sort 14,10,-12,9,15,35 (Original Content) i. 14,10,9,15,35,-12 ii. 14,10,15,35,9,-12 iii. 14,15,35,10,9,-12 iv. 15,35,14,10,9,-12 (Unsorted status after 4th pass) Selection Sort 14,10,-12,9,15,35 (Original Content) i. 35,10,-12,9,15,14 ii. 35,15,-12,9,10,14 iii. 35,15,14,9,10,-12 iv. 35,15,14,10,9,-12	
			For Bubble Sort *(1 ½ Mark if (iv) pass is correct)* *OR* *(½ Mark for (i) pass)* *(½ Mark for (ii) pass)*	

			(½ Mark for (iii) pass) *For Selection Sort* *(1 ½ Mark if (iv) pass is correct)* *OR* *(½ Mark for (i) pass)* *(½ Mark for (ii) pass)* *(½ Mark for (iii) pass)*	
	(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

	Ans		`def bSearch(L, key):`
			`  low = 0`
			`  high = len(L)-1`
			`  found = False`
			`  while (low <= high) and (not found):`
			`  mid = (low+high)//2`
			`  if L[mid] == key:`
			`  found = True`
			`  elif L[mid] < key:`
			`  low = mid + 1`
			`  else:`
			`  high = mid - 1`
			`  if found:`
			`  return mid+1  # may even be 'return mid'`
			`  else:`
			`  return -1`	

			(½ Mark for correct Initialization of lower and upper bounds) *(½ Mark for correct loop)* *(½ Mark for reassigning Mid,Low,Up bound)* *(½ Mark for returning correct value)*	
	(c)		**Write PUSH (Books) and POP (Books) methods in python to add Books and remove Books considering them to act as Push and Pop operations of Stack.**	4

	Ans		`def push(Books):`
			`  Stack.append(Books)`
			`  print 'Element:',Book,'inserted successfully'`	

```
def pop():
  if Stack == []:
    print('Stack is empty!')
  else:
    print('Deleted element is',Stack.pop())
```

(2 Marks for correctly pushing an element into the stack)
(1 Mark for checking empty stack in POP())
(1 Mark for popping element from stack)

(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

Ans

```
def prime_numbers(N):
  for I in range(2, N+1):
    M = I // 2
    IsPrime=1
    for J in range(2, M+1):
      if I % J == 0:
        IsPrime=0
        break
    if IsPrime==1:
      print(I)
```

OR
Any other correct equivalent method definition

(1 Mark for correct loops)
(1 Mark for checking prime numbers between 2 to N)
(1 Mark for displaying the numbers)

(e) **Evaluate the following postfix notation of expression. Show status of stack after every operation.** 2

`84,62,-,14,3, *,+`

Ans

Element	Stack
84	84
62	84, 62
-	22
14	22, 14
3	22, 14, 3
*	22, 42
+	64

			(1 mark for evaluating till 22) *(½ mark for evaluating till 22,42)* *(½ mark for evaluating till final 64)* *Note:* *Only 1 mark to be awarded for evaluating final answer as 64 without showing stack contents*	

4	**(a)**		**Differentiate between the following:**
			`(i) f = open ('diary. txt', 'r')`
			`(ii) f = open ('diary. txt', 'w')`
				1

	Ans		**(i) diary.txt is opened for reading data** **(ii) diary.txt is opened for writing data**	
			(1 mark for writing correct difference) *OR* *(½ Mark for each correct explanation of (i) and (ii))*	
	(b)		Write a method in python to read the content from a text file diary.txt line by line and display the same on screen.	2

	Ans		`def read_file():`
			`  inFile = open('diary.txt', 'r')`
			`  for line in inFile:`
			`  print line`	

			(½ Mark for opening the file) *(1 Mark for reading all lines)* *(½ Mark for displaying all lines)*	

	(c)		Consider the following definition of class Member, write a method in python to write the content in a pickled file member.dat
			
			`class Member:`
			`  def_init_(self,Mno,N) :`
			`  self.Memno=Mno`
			`  self.Name=N`
			`def Show(self):`
			`  Display (self.Memno, "#" , self.Name)`
				3

	Ans		`import pickle`	

```
class Member:
    def_init_(self,Mno,N) :
            self.Memno=Mno
            self.Name=N
    def Show(self):
            Display (self.Memno, "#" , self.Name)
    def store_data(self):
            piFile = open('member.dat','wb')
            pickle.dump(self, piFile)
            piFile.close()
```

(1 Mark for method header)
(1 Mark for opening the file member.dat in correct mode)
(1 Mark each for writing member details into the file)

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

Id	Product	Qty	Price	Transaction Date
101	Plastic Folder 12”	100	3400	2014-12-14
104	Pen Stand Standard	200	4500	2015-01-31
105	Stapler Medium	250	1200	2015-02-28
109	Punching Machine Big	200	1400	2015-03-12
103	Stapler Mini	100	1500	2015-02-02

Ans **Candidate keys : Id, Product**
Primary keys : Id

(1 Mark for writing correct Candidate keys)
(1 Mark for writing correct Primary key)
Note:
No marks to be deducted for mentioning Price and/or Transaction Date as additional candidate keys.

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

Table: DEPT

DCODE	DEPARTYMENT	CITY
D01	MEDIA	DELHI

			D02 MARKETING DELHI D03 INFRASTRUCTURE MUMBAI D05 FINANCE KOLKATA D04 HUMAN RESOURCE MUMBAI **Table: WORKER** WNO 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 D02 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 workers.**	
			(i) To display Wno, Name, Gender from the table WORKER in descending order of Wno.	1

	Ans		`SELECT Wno,Name,Gender FROM Worker`
			`ORDER BY Wno DESC;`
			
			(½ Mark for `SELECT Wno,Name,Gender FROM Worker`*)*
			(½ Mark for `ORDER BY Wno DESC`*)*	

			(ii) To display the Name of all the FEMALE workers from the table WORKER.	1

			`SELECT Name FROM Worker`
			`WHERE Gender='FEMALE';`
			
			(½ Mark for `SELECT Name FROM Worker`*)*
			(½ Mark for `WHERE Gender='FEMALE'`*)*	

			(iii) To display the Wno and Name of those workers from the table WORKER who are born between '1987-01-01' and '1991-12-01'.	1

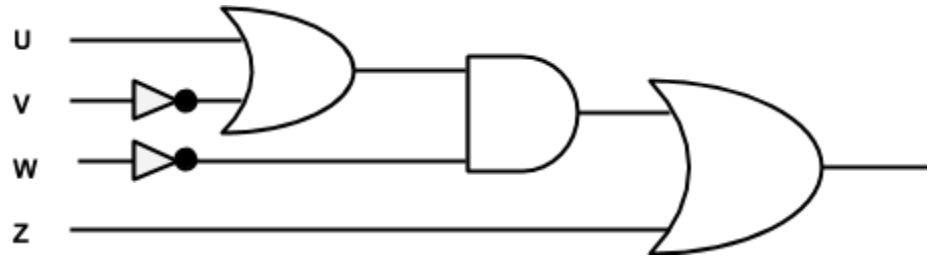
			SELECT Wno, Name FROM Worker WHERE DOB BETWEEN '1987-01-01' AND '1991-12-01'; OR SELECT Wno, Name FROM Worker WHERE DOB >='1987-01-01' AND DOB <='1991-12-01' *(½ Mark for* SELECT Wno,Name FROM Worker*)* *(½ Mark for* WHERE DOB BETWEEN '1987-01-01' AND '1991-12-01' *OR* WHERE DOB >='1987-01-01' AND DOB <='1991-12-01')	
			(iv) To count and display MALE workers who have joined after '1986-01-01'.	1
			SELECT COUNT(*) FROM Worker WHERE GENDER='MALE' AND DOJ > '1986-01-01'; OR SELECT * FROM Worker WHERE GENDER='MALE' AND DOJ > '1986-01-01'; *(Any valid query for counting and/or displaying for male workers will be awarded 1 mark)*	
			(v) SELECT COUNT(*),DCODE FROM WORKER GROUP BY DCODE HAVING COUNT(*)>1;	½
			COUNT(*) DCODE 2 D01 2 D05 *(½ Mark for correct output)*	
			(vi) SELECT DISTINCT DEPARTMENT FROM DEPT;	½
	Ans		Department MEDIA MARKETING INFRASTRUCTURE FINANCE HUMAN RESOURCE *(½ Mark for correct output)*	

			(vii) `SELECT NAME,DEPARTMENT,CITY`
			`FROM WORKER W,DEPT D`
			`WHERE W.DCODE=D.DCODE AND WNO<1003;`
				½

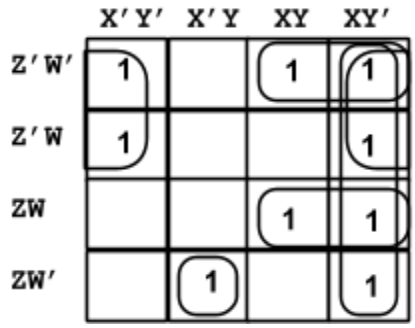
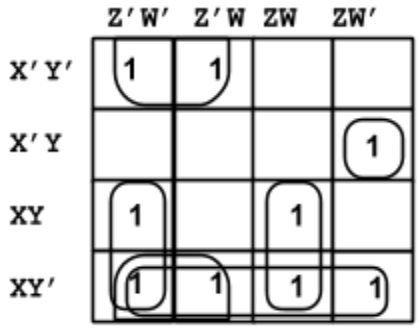
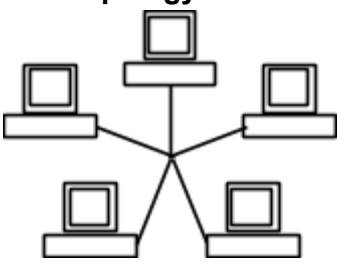
			NAME DEPARTMENT CITY George K MEDIA DELHI Ryma Sen INFRASTRUCTURE MUMBAI *(½ Mark for correct output)*	
			(viii) `SELECT MAX(DOJ),MIN(DOB)FROM WORKER;`	½
			MAX(DOJ) MIN(DOB) 2014-06-09 1984-10-19 *(½ Mark for correct output)*	
			Note: In the output queries, please ignore the order of rows	
6	(a)		Verify the following using Boolean Laws. `X + Y'= X.Y+X.Y'+X'.Y'`	2

	Ans		`L.H.S`
			`=X + Y'`
			`=X.(Y+Y')+ (X + X').Y'`
			`=X.Y + X.Y' + X.Y' +X'.Y'`
			`=X.Y + X.Y' + X'.Y'`
			`=R.H.S`
			OR
			`R.H.S`
			`=X.Y + X.Y' + X'.Y'`
			`=X.(Y + Y')+ X'.Y'`
			`=X.1 + X'.Y'`
			`=X + X'.Y'`
			`=X + Y'`
			`=L.H.S`	

			(2 Marks for any valid verification using Boolean Laws) *OR* *(1 Mark for partial correct verification using Boolean Laws)*	
	(b)		Draw the Logic Circuit for the following Boolean Expression : `(U + V').W' + Z`	2

<table>
<tr><td></td><td>Ans</td><td></td><td> 
</td><td></td></tr>
<tr><td></td><td></td><td></td><td>(½ Mark for V' and W')
(½ Mark for (U+V'))
(½ Mark for (U+V').W')
(½ Mark for (U+V').W'+Z)</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>Derive a Canonical SOP expression for a Boolean function F, represented by the following truth table:

<table>
<tr><th>A</th><th>B</th><th>C</th><th>F(A,B,C)</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table></td><td>1</td></tr>
<tr><td></td><td>Ans</td><td></td><td>F(A,B,C) = A'B'C' + A'BC + AB'C' + ABC
OR
F(A,B,C) = ∑(0,3,4,7)</td><td></td></tr>
<tr><td></td><td></td><td></td><td>(1 Mark for the correct SOP form)
OR
(½ Mark for writing any two term correctly)
Note: Deduct ½ mark if wrong variable names are used</td><td></td></tr>
<tr><td></td><td>(d)</td><td></td><td>Reduce the following Boolean Expression to its simplest form using K-Map :
F(X,Y,Z,W) = ∑(0,1,6,8,9,10,11,12,15)</td><td>3</td></tr>
</table>

	Ans		 **OR**  **Simplified Expression: XY' + Y'Z' + XZ'W' + XZW + X'YZW'**	
			(½ Mark for each of grouping - 5 groups x ½ = 2½ Marks) *(½ Mark for writing final expression in reduced/minimal/non redundant form as* **XY' + Y'Z' + XZ'W' + XZW + X'YZW'** *)* *Note: Deduct ½ mark if wrong variable names are used*	
7	(a)		**Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks.**	1
	Ans		**Bus topology** **Star Topology**  OR any valid illustration of Bus and Star Topology.	
			(½ Mark for drawing each correct layout)	

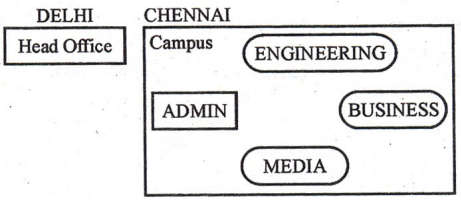
	(b)		**What is a spam mail?**	1
	Ans		**Spam is the abuse of electronic messaging systems (including most broadcast media, digital delivery systems) to send unsolicited bulk messages indiscriminately.**	
			(1 Mark for correct explanation)	
	(c)		**Differentiate between ftp and http.**	1
	Ans		**FTP is a protocol to transfer files over the Internet** **HTTP is a protocol which allows the use of HTML to browse web pages in the World Wide Web.**	
			(1 Mark for any valid differentiation)	
	(d)		**Out of the following, which is the fastest (i) wired and (ii) wireless medium of communication?** **Infrared, Co-axial Cable, Ethernet Cable, Microwave, Optical Fiber**	1
	Ans		***(i) Wired – Optical Fiber*** ***(ii) Wireless - Infrared OR Microwave***	
			(½ Mark each for Wired and Wireless **medium of communication*)***	
	(e)		**What is Worm? How is it removed?**	1
	Ans		**A worm is a self-replicating computer program. It uses a network to send copies of itself to other computers on the network and it may do so without any user intervention.** **Most of the common anti-virus(anti-worm) remove worm.**	
			(½ Mark for writing correct meaning of Worm) ***(½ Mark for correct definition of removing Worm)***	
	(f)		**Out of the following, which all comes under cyber crime?** **(i) Stealing away a brand new computer from a showroom.** **(ii) Getting in someone's social networking account without his consent and posting pictures on his behalf to harass him.** **(iii) Secretly copying files from server of a call center and selling it to the other organization.** **(iv) Viewing sites on a internet browser.**	1
	Ans		***(ii) & (iii)***	

(½ Mark for choosing each of the correct options)
Note:
- *No marks to be given, if all options are there in the answer*
- *½ Mark to be deducted, if one extra option is given along with the correct options*

(g)

Perfect Edu Services Ltd. is an educational organization.It is planning to setup its India campus at Chennai with its head office at Delhi. The Chennai campus has 4 main buildings - ADMIN, ENGINEERING, BUSINESS and MEDIA.

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.



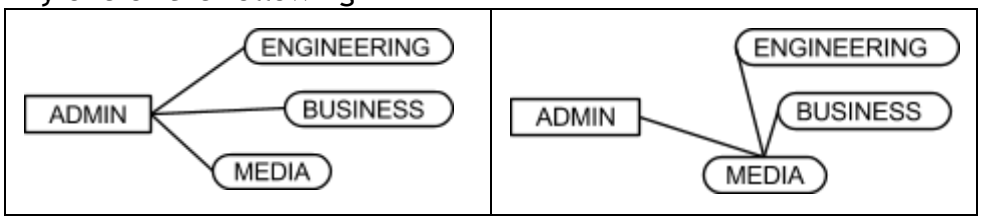
Shortest Distances between various building:

ADMIN to ENGINEERING	**55m**
ADMIN to BUSINESS	**90m**
ADMIN to MEDIA	**50m**
ENGINEERING to BUSINESS	**55m**
ENGINEERING to MEDIA	**50m**
BUSINESS to MEDIA	**45m**
DELHI Head Office to CHENNAI Campus	**2175 km**

Number of Computers installed at various building are as follows:

ADMIN	**110**
ENGINEERING	**75**
BUSINESS	**40**
MEDIA	**12**
DELHI Head Office	**20**

(i) Suggest the most appropriate location of the server inside the CHENNAI campus (out of the 4 buildings), to get the best connectivity for maximum no. of computers. Justify your answer. 1

	Ans		**ADMIN** (due to maximum number of computers) OR **MEDIA** (due to shorter distance from the other buildings)	
			(1 Mark for mentioning Correct building name with reason) **OR** ***(½ Mark to be deducted for not giving reason)***	
			(ii) Suggest and draw the cable layout to efficiently connect various buildings within the CHENNAI campus for connecting the computers.	1
	Ans		Any one of the following 	
			(1 Mark for drawing correct layout)	
			(iii) Which hardware device will you suggest to be procured by the company to be installed to protect and control the intemet uses within the campus?	1
	Ans		**Firewall OR Router**	
			(1 Mark for correct Answer)	
			(iv) Which of the following will you suggest to establish the online face-to-face communication between the people in the Admin Office of CHENNAI campus and DELHI Head Office? **(a) Cable TV** **(b) Email** **(c) Video Conferencing** **(d) Text Chat**	1
	Ans		**Video Conferencing**	
			(1 Mark for correct Option / Answer)	