Examination Papers, 2017
[Delhi]

Maximum Marks : 70] [*Duration* : 3 Hours

General Instructions :

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

(*ii*) *Programming Language : C++.*

SECTION – B

Q.1. (*a*) Which of the following can be used as valid variable identifier(s) in Python? 2

(*i*) total

(*ii*) 7Salute

(*iii*) Que$tion

(*iv*) global

(*b*) Name the Python Library modules which need to be imported to invoke the following functions: 1

(*i*) ceil()

(*ii*) randint()

(*c*) Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code. 2

```
TEXT=“”GREAT
DAY“ ”
for T in range [0, 7] :
    print TEXT(T)
print T+TEXT
```

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

```
STR = [“90”, “10”, “30”, “40”]
COUNT = 3
SUM = 0
for I in [1,2,5,4] :
    S = STR[COUNT]
    SUM = float  (S)+I
    print SUM
    COUNT−=1
```

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

```
class ITEM:
```

```
    def _init_(self,I = 101,N="Pen",Q=10): #constructor
        self.Ino=I
        self.IName=N
        self.Qty=int(Q);
    def Buy(self,Q):
        self.Qty = self.Qty + Q
    def Sell(self,Q):
        self.Qty −= Q
    def ShowStock(self):
        print self.Ino,":", self.IName, "#", self.Qty
I1=ITEM()
I2=ITEM(100,"Eraser",100)
I3=ITEM(102,"Sharpener")
I1.Buy(10)
I2.Sell(25)
I3.Buy(75)
I3.ShowStock()
I1.Showstock()
I2.ShowStock()
```

(*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 N.** **2**

```
import random
SIDES=["EAST", "WEST", "NORTH", "SOUTH"];
N=random.randint(1,3)
OUT=""
for I in range(N,1,–1):
    OUT=OUT+SIDES[I]
print OUT
```

(*i*) SOUTHNORTH	(*ii*) SOUTHNORTHWE ST
(*iii*) SOUTH	(*iv*) EASTWESTNORTH

Ans. (*a*) The valid variable is: (*i*) total

(*b*) (*i*) math

(*ii*) random

(*c*) The corrected code with underlined errors are:

```
TEXT="GREAT"
DAY=""
for T in range(0,5):
    print TEXT[T]
print DAY, TEXT
```

(*d*) The output is:

41.0

32.0

15.0

94.0

(*e*) The output is:

102 : Sharpener # 85

101 : Pen # 20

100 : Eraser # 75

(*f*) The possible outcome(s) are: (*i*) & (*iii*)

Minimum value of N is 1 and maximum value is 3.

Q.2. (*a*) List four characteristics of Object Oriented Programming. **2**

(*b*) class Test: **2**

```
rollno=1
marks=75
def_init_(self,r,m) :                #function 1
    self.rollno=r
    self.marks=m
def assign(self,r,m):                #function 2
    rollno = n
    marks = m
def check(self):                     #function 3
    print self.rollno,self.marks
print rollno,marks
```

(*i*) In the above class definition, both the functions - function 1 as well as function 2 have similar definition. How are they different in execution?

(*ii*) Write statements to execute function 1 and function 2.

(*c*) Define a class RING in Python with following specifications: **4**

Instance Attributes

– RingID # Numeric value with a default value 101

– Radius # Numeric value with a default value 10

– Area # Numeric value

Methods :

– AreaCal() # Method to calculate Area as
 # 3.14*Radius*Radius

– NewRing() # Method to allow user to enter values of
 # RingID and Radius. It should also
 # Call AreaCal Method

– ViewRing() # Method to display all the Attributes

(*d*) Differentiate between static and dynamic binding in Python ? Give suitable examples of each. 2

(*e*) Write two methods in Python using concept of Function Overloading (Polymorphism) to perform the following operations: 2

(*i*) A function having one argument as side, to calculate Area of Square as side*side

(*ii*) A function having two arguments as Length and Breadth, to calculate Area of Rectangle as Length*Breadth.

Ans. (*a*) Four characteristics of Object-oriented programming are: Data hiding, Encapsulation, Inheritance, and Polymorphism.

(*b*) (*i*) Function 1 is a constructor which gets executed automatically when the object of class Test is created. Function 2 is a class member and called to assign the values to rollno and marks.

(*ii*) Function 1 : T1=Test(10, 70)

Function 2 : T1.assign(10,70)

(*c*) The class is:

```
class RING:
    def __init__(self):
        self.RingID = 100
        self.Radius = 10
        self.Area = 0
    def AreaCal(self):
        self.Area = 3.14*self.Radius*self.Radius
    def NewRing(self):
        self.RingID = int(input("Enter ring id : "))
        self.Radius = float(input("Enter radius : "))
        self.AreaCal()
    def ViewRing(self):
        print ("Ring ID:", self.RingID)
        print ("Radius:", self.Radius)
        print ("Area:", self.Area)
```

(*d*) **Static binding.** It allows linking of function call to the function definition during compilation of the program. In this binding, Static type binding, "basically, the binding process is done just once, before execution. For example, the following code binding a fix value:

```
fact x =
    if x == 0 then
        1
    else
        x * fact (x - 1)
```

Dynamic binding. Dynamic type binding is when the type of a variable is not decided until the program runs. Dynamically-bound types are always implicit. It allows linking of a function during run time. That means the code of the function that is to be linked with function call is unknown until it is executed. For example, the following function only returns the value at the time of function call.

```
def fact(x):
    if x == 0:
        return 1
    else:
        return x * fact(x - 1)
```

Dynamic binding of functions makes the program more flexible than static binding.

(*e*) Two functions are:

```
def Area(side):
    print side*side
def Area(Length, Breadth):
    print Length*Breadth
```

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

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

152, 104, –100, 604, 190, 204

(*b*) Write definition of a method OddSum(NUMBERS) to add those values in the list of NUMBERS, which are odd. 3

(*c*) Write Addnew(Book) and Remove(Book) methods in Python to Add a new Book and Remove a Book from a List of Books, considering them to act as PUSH and POP operations of the data structure Stack. 4

(*d*) Write definition of a Method AFIND(CITIES) to display all the city names from a list of CITIES, which are starting with alphabet A. 2

For example:

If the list CITIES contains

["AHMEDABAD","CHENNAI","NEW DELHI","AMRITSAR","AGRA"]

The following should get displayed

AHMEDABAD

AMRITSAR

AGRA

(*e*) Evaluate the following Postfix notation of expression: 2

2, 3, *, 24, 2, 6, +, /, –

Ans. (*a*) The bubble sort status in descending order is:

		152	104	-100	604	190	204
1st pass	:	152	104	604	190	204	-100
2nd pass	:	152	604	190	204	104	-100
3rd pass	:	604	190	204	152	104	-100

(*b*) The function is:

```
# Function to add odd values in the list of NUMBERS.
def OddSum(NUMBERS) :
    S = 0
```

```
    for i in range(len(NUMBERS)):
        if (NUMBERS[i] % 2 != 0):
            S = S + NUMBERS[i]
    print ("Sum of odd numbers:", S)
```

(*c*) The class is:

```
class Stack:
    Book = []
    # Push an item onto the top of the stack.
    def Addnew(self,element):
        Stack.Book.append(element)
        print "Element inserted"
    # Remove the top element from the stack.
    def Remove(self):
        if (Stack.Book==[]):
            print "Stack empty!"
        else:
            print 'Deletd book:', Stack.Book.pop()
```

(*d*) The method is:

```
# Method to display city names starting with alphabet A
def AFIND(CITIES):
    for i in CITIES:
        if i[0] == 'A':
            print i
```

(*e*) The postfix notation is as follows:

Scanned Elements	Stack	Postfix
2	Push (2)	2
3	Push (3)	2, 3
*	Pop (3) and (2)	
	Calculate: 3 * 2 = 6	
	Push (6)	6
24	Push (24)	6, 24
2	Push (2)	6, 24, 2
6	Push (6)	6, 24, 2, 6
+	Pop (6) and (2)	
	Calculate: 6 + 2 = 8	
	Push (8)	6, 24, 8
/	Pop (8) and (24)	
	Calculate: 24 / 8 = 3	
	Push (3)	6, 3
-	Pop (3) and (6)	
	Calculate: 6 - 3 = 3	
	Push (3)	3

∴ **Ans = 3**

Q.4. (*a*) Differentiate between file modes r+ and w+ with respect to Python. 1

(*b*) Write a method in Python to read lines from a text file DIARY.TXT, and display those lines, which are starting with an alphabet 'P' 2

(*c*) Considering the following definition of class COMPANY, write a method is Python to search and display the content in a pickled file COMPANY.DAT, where CompID is matching with the value '1005'. 3

```
class Company:
    def_init_(self,CID,NAM):
        self.CompID  =  CID     # CompID Company ID
        self.CName   =  NAM     # CName Company Name
        self.Turnover =  1000
    def Display(self):
        print self.CompID,":",self.CName,":",self.Tunover
```

Ans. (*a*) In r+ mode, a disk file opens for data reading and writing where the file pointer will be at the beginning of the file.

In w+ mode, it opens a file for writing and reading data into disk. Also, overwrites the existing file if the file exists. If the file does not exist, creates a new file for writing.

(*b*) The method is:

```
def PLine():
    if os.path.isfile("DAIRY.TXT"):
        fb = open("DAIRY.TXT", 'r')
        line = fb.readline() # Read a line
        while line:
            if line[0] =='P':
                print line
            line = fb.readline() # Read a line
        fb.close()
    else:
        print "Source file does not exist."
```

(*c*) The method is:

```
def Company1005():
    if not os.path.isfile("COMPANY.DAT"):
        print "COMPANY.DAT", "file does not exist"
    else:
        with open("COMPANY.DAT", 'rb') as Cobj:
            try:
                while True:
                    C = load(Cobj)
                    if C.CompID == 1005:
                        C.Display()
            except EOFError:
                pass
```

SECTION – C

Q.5. (*a*) Observe the following table CANDIDATE carefully and write the name of the RDBMS operation out of (*i*) SELECTION (*ii*) PROJECTION (*iii*) UNION (*iv*) CARTESIAN PRODUCT, which has been used to produce the output as shown in RESULT. Also, find the Degree and Cardinality of the RESULT. 2

TABLE: CANDIDATE

NO	NAME	STREAM
C1	AJAY	LAW
C2	ADITI	MEDICAL
C3	ROHAN	EDUCATION
C4	RISHAV	ENGINEERING

RESULT

NO	NAME
C3	ROHAN

(*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: BOOK

Code	BNAME	TYPE
F101	The priest	Fiction
L102	German easy	Literature
C101	Tarzan In the lost world	Comic
F102	Untold Story	Fiction
C102	War heroes	Comic

TABLE: MEMBER

MNO	MNAME	CODE	ISSUEDATE
M101	RAGHAV SINHA	L102	2016-10-13
M103	SARTHAK JOHN	F102	2017-02-23
M102	ANISHA KHAN	C101	2016-06-12

(*i*) To display all details from table MEMBER in descending order of ISSUEDATE.

(*ii*) To display the BNO and BNAME of all Fiction Type books from the table BOOK.

(*iii*) To display the TYPE and number of books in each TYPE from the table BOOK.

(*iv*) To display all MNAME and ISSUEDATE of those members from table MEMBER who have books issued (i.e. ISSUEDATE) in the year 2017.

(*v*) SELECT MAX (ISSUEDATE) FROM MEMBER;

(*vi*) SELECT DISTINCT TYPE FROM BOOK;

(*vii*) SELECT A.CODE,BNAME,MNO,MNAME
FROM BOOK A, MEMBER B WHERE A.CODE=B.CODE;

(*viii*) SELECT BNAME FROM BOOK
WHERE TYPE NOT IN ("FICTION","COMIC");

Ans. (*a*) The RDBMS operation is: SELECTION

The Degree of the table RESULT is 2 and Cardinality is 1.

(*b*) (*i*) SELECT * FROM MEMBER ORDER BY ISSUEDATE DESC;

(*ii*) SELECT BNO, BNAME FROM BOOK WHERE TYPE = 'Fiction';

(*iii*) SELECT BNO, TYPE, COUNT(*) FROM BOOK GROUP BY TYPE;

(*iv*) SELECT MNAME, ISSUEDATE FROM MEMBER
WHERE YEAR(ISSUEDATE) = 2017;

(*v*) **MAX(ISSUEDATE)**
2017-02-13

(*vi*) **TYPE**
Fiction
Literature
Comic

(*vii*)

BNO	BNAME	MNO	MNAME
L102	German easy	M101	RAGHAV SINHA
C101	Tarzan in the lost world	M102	ANISHA KHAN
F102	Untold Story	M103	SARTHAK JOHN

(*viii*) **BNAME**
German easy

Q.6. (*a*) State Distributive Laws of Boolean Algebra and verify them using truth table. 2

(*b*) Draw the Logic Circuit of the following Boolean Expression using only NAND Gates: 2
X.Y + Y.Z

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

U	V	W	F (U,V,W)
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

(*d*) Reduce the following Boolean Expression to its simplest form using K-Map: **3**
F(X, Y, Z, W) = Σ (0,1,2,3,4,5,10,11,14)

Ans. (*a*) The distributive laws with truth tables are:

(*i*) First law: X.(Y + Z) = X.Y + X.Z

The truth table is:

X	Y	Z	Y + Z	X.Y	X.Z	X.(Y + Z)	X.Y + X.Z
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	0	1	1	1
1	1	0	1	1	0	1	1
1	1	1	1	1	1	1	1

Both the columns X.(Y + Z) and X.Y + X.Z are identical, hence proved.

(*ii*) Second law: X + Y.Z = (X + Y) . (X + Z)

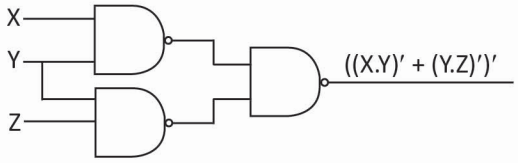
The truth table is:

X	Y	Z	Y.Z	X + Y.Z	X + Y	X + Z	(X + Y).(X + Z)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

Both the columns X + Y.Z and (X + Y).(X + Z) are identical, hence proved.

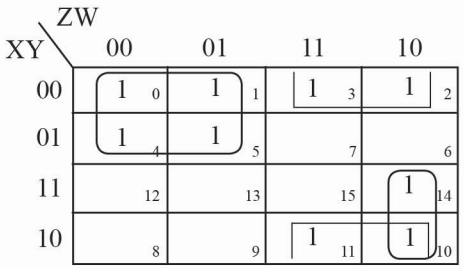
(*b*) X.Y + Y.Z

The logic circuit of the expression X.Y + Y.Z = (X.Y + Y.Z)″ = ((X.Y)′ + (Y.Z)′)′



(*c*) The SOP expression is: F(U, V, W) = U'V'W' + U'VW' + U'VW + UVW'

(*d*) The K-map is:



F = X'Z' + Y'Z + XZW'

Q.7. (*a*) Differentiate between Radio Link and Microwave in context of wireless communication technologies. 2

(*b*) Amit used a pen drive to copy files from his friend's laptop to his office computer. Soon his office computer started abnormal functioning. Sometimes it would restart by itself and sometimes it would stop functioning totally. Which of the following options out of (*i*) to (*iv*), would have caused the malfunctioning of the computer? Justify the reason for your chosen option: 2

(*i*) Computer Worm **(*ii*) Computer Virus**

(*iii*) Computer Bacteria **(*iv*) Trojan Horse**

(*c*) Jai is an IT expert and a freelancer. He recently used his skills to access the Administrator password for the network server of Megatech Corpn Ltd. and provided confidential data of the organization to its Director, informing him about the vulnerability of their network security. Out of the following options (*i*) to (*iv*), which one most appropriately defines Jai ? 2

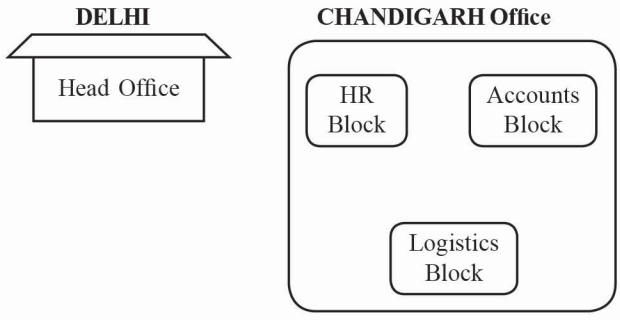
Justify the reason for your chosen option:

(*i*) Hacker **(*ii*) Cracker**

(*iii*) Operator **(*iv*) Network Admin**

(*d*) Hi Speed Technologies Ltd. is a Delhi based organization which is expanding its office setup to Chandigarh. At Chandigarh office campus, they are planning to have 3 different blocks for HR, Accounts and Logistics related work. Each block has number of computers, which are required to be connected in a network for communication, data and resource sharing.

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



Shortest distances between various blocks/locations:

HR Block to Accounts Block	**400 metres**
Accounts Block to Logistics Block	**200 metres**
Logistics Block to HR Block	**150 metres**
DELHI Head Office to CHANDIGARH Office	**270 km**

Number of Computers installed at various blocks are as follows :

HR Block	**70**
Accounts Block	**50**
Logistics Block	**40**

(*i*) Suggest the most appropriate block/location to house the SERVER the CHANDIGARH Office (out of the 3 blocks) to get the best and effective connectivity. Justify your answer. **1**

(*ii*) Suggest the best wired medium and draw the cable layout (Block to Block) to efficiently connect various Blocks within the CHANDIGARH office compound. **1**

(*iii*) Suggest a device / software and its placement that would provide data security for the entire network of CHANDIGARH office. **1**

(*iv*) Which of the following kind of network, would it be ? **1**

(*a*) PAN

(*b*) WAN

(*c*) MAN

(*d*) LAN

Ans. (*a*) The differences are:

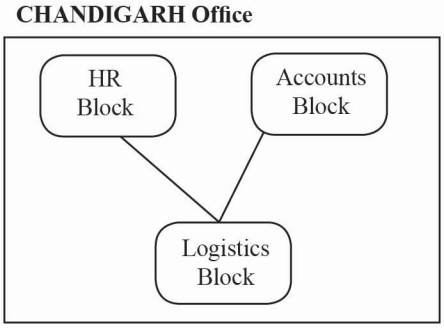
- In radio link data communication data is transmitted into all direction but it is slower than microwave communication.
- In microwave data is transmitted on line of sight principle, faster than radio link.
- The frequency of radio waves is 3kHz to 300 GHz but microwaves are defined to have frequencies ranging from 300 GHz to only 300 MHz.
- Radio waves in general have long distance communication capabilities, but microwaves do not have these abilities.

(*b*) (*ii*) Computer Virus and (*iv*) Trojan Horse. As pen drive is a good carrier of computer virus and Trojan Horse, which can affect the system files and 'starts' abnormal functioning in the computer. So, computer restart by itself and sometimes it would stop functioning totally.

(*c*) **Hacker.** A hacker is a computer expert who breaks into the computer network of an organisation without any malicious intent.

(*d*) (*i*) The server should placed in HR Block as it contains maximum number of computers.

(*ii*) The best wired medium is Optical Fibre cable or CAT5 or CAT6 cable. The cable layout is:



(*iii*) Firewall should be placed with the server HR block.

(*iv*) (*b*) WAN and (*d*) LAN

Examination Papers, 2017
[All India]

Maximum Marks : 70] [*Duration* : 3 Hours

General Instructions :

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

(*ii*) *Answer the questions after carefully reading the text.*

SECTION – B

Q.1. (*a*) Which of the following can be used as valid variable identifier(s) in Python? 2

(*i*) 4thSum

(*ii*) Total

(*iii*) Number#

(*iv*) _Data

(*b*) Name the Python Library modules which need to be imported to invoke the following functions: 1

(*i*) floor()

(*ii*) randint()

(*c*) Rewrite the following code in Python after removing all syntax error(s). Underline each correction done in the code. 2

```
STRING=“”WELCOME
NOTE“ ”
for S in range [0, 8] :
    print STRING(S)
print S+STRING
```

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

```
TXT   = [“20”, “50”, “30”, “40”]
CNT   = 3
TOTAL = 0
for C in [7, 5, 4, 6] :
    T = TXT[CNT]
    TOTAL = float  (T) + C
    print TOTAL
    CNT−=1
```

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

```
class INVENTORY:
```

```
def_init_(self,C=101,N="Pad",Q=100): #constructor
    self.Code=C
    self.IName=N
    self.Qty=int(Q);
def Procure(self,Q):
    self.Qty = self.Qty + Q
def Issue(self,Q):
    self.Qty −= Q
def Status(self):
    print self.Code,":", self.IName, "#", self.Qty
I1=INVENTORY()
I2=INVENTORY(105,"Thumb Pin",50)
I3=INVENTORY(102,"U Clip")
I1.Procure(25)
I2.Issue(15)
I3.Procure(50)
I1.Status()
I3.Status()
I2.Status()
```

(*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 N. 2

```
import random
NAV  =  ["LEFT", "FRONT", "RIGHT", "BACK"];
NUM  =  random.randint(1,3)
NAVG =  " "
for C in range(NUM,1,–1):
    NAVG = NAVG+NAV[I]
print NAVG
```

(*i*) BACKRIGHT	**(*ii*) BACKRIGHTFRONT**
(*iii*) BACK	**(*iv*) LEFTFRONTRIGHT**

Ans. (*a*) The valid variables are: (*ii*) total and (*iv*) _Data

(*b*) (*i*) math

(*ii*) random

(*c*) The corrected code with underlined errors are:

```
STRING="WELCOME"
NOTE=""
for S in range(0,7):
    print STRING[S]
print S, STRING
```

(*d*) The output is:

47.0

35.0

54.0

26.0

(*e*) The output is:

101 : Pad # 125

102 : U Clip # 150

105 : Thumb Pin # 35

(*f*) The possible outcome is: (*i*)

Minimum value of NUM is 1 and maximum value is 3.

Q.2. (*a*) List four characteristics of Object Oriented Programming. **2**

(*b*) class Exam: **2**

```
Regno=1
Marks=75
def_init_(self,r,m) :                #function 1
    self.Regno=r
    self.Marks=m
def Assign(self,r,m):                #function 2
    Regno = r
    Marks = m
def Check(self):                     #function 3
    print self.Regno, self.Marks
    print Regno, Marks
```

(*i*) In the above class definition, both the functions — function 1 as well as function 2 have similar definition. How are they different in execution?

(*ii*) Write statements to execute function 1 and function 2.

(*c*) Define a class BOX in Python with following specifications: **4**

Instance Attributes

– BoxID # Numeric value with a default value 101

– Side # Numeric value with a default value 10

– Area # Numeric value with a default value 0

Methods :

– ExecArea() # Method to calculate Area as
 # Side * Side

– NewBox() # Method to allow user to enter values of
 # BoxID and Side. It should also
 # Call ExecArea Method

– ViewBox() # Method to display all the Attributes

(*d*) Differentiate between static and dynamic binding in Python ? Give suitable examples of each. 2

(*e*) Write two methods in Python using concept of Function Overloading (Polymorphism) to perform the following operations: 2

(*i*) A function having one argument as Radius, to calculate Area of Circle as 3.14*Radius*Radius.

(*ii*) A function having two arguments as Base and Height, to calculate Area of right-angled triangle as 0.5*Base*Height.

Ans. (*a*) Four characteristics of Object-oriented programming are: Data hiding, Encapsulation, Inheritance, and Polymorphism.

(*b*) (*i*) Function 1 is a constructor which will invoke automatically when the object of class Exam is created whereas Function 2 is a class member which can only invoked through the object of the class Exam to assign the values to Regno and Marks.

(*ii*) To execute Function 1, the statement is:

E=Exam(100, 80)

To execute Function 2, the statement is:

E.Assign(102,78)

(*c*) The class is:

```
class BOX:
    def __init__(self):
        self.BoxID = 100
        self.Side = 10
        self.Area = 0
    def ExecArea(self):
        self.Area = self.Side * self.Side
    def NewBox(self):
        self.BoxID = int(input("Enter box id: "))
        self.Side = int(input("Enter side: "))
        self.ExecArea()
    def ViewBox(self):
        print "Box ID:", self.BoxID
        print "Side:", self.Side
        print "Area:", self.Area
```

(*d*) **Static binding.** It allows linking of function call to the function definition during compilation of the program. In this binding, Static type binding, "basically, the binding process is done just once, before execution. For example, the following code binding a fix value:

```
fact x =
    if x == 0 then
        1
    else
        x * fact (x - 1)
```

Dynamic binding. Dynamic type binding is when the type of a variable is not decided until the program runs. Dynamically-bound types are always implicit. It allows linking of a function during run time. That means the code of the function that is to be linked with function call is unknown until it is executed. For example, the following function only returns the value at the time of function call.

```
def fact(x):
    if x == 0:
        return 1
    else:
        return x * fact(x - 1)
```

Dynamic binding of functions makes the program more flexible than static binding.

(*e*) Two functions are:

```
def Area(Radius):
    print 3.14*Radius*Radius
def Area(Base, Height):
    print 0.5*Base*Height
```

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

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

50, 42, –10, 60, 90, 20

(*b*) Write definition of a method EvenSum(NUMBERS) to add those values in the list of NUMBERS, which are odd. 3

(*c*) Write Addnew(Member) and Remove(Member) methods in Python to Add a new Member and Remove a Member from a List of Members, considering them to act as INSERT and DELETE operations of the data structure Queue. 4

(*d*) Write definition of a method MSEARCH(STATES) to display all the state names from a list of STATES, which are starting with alphabet M. 2

For example:

If the list STATES contains

["MP","UP","WB","TN","MH","MZ","DL","BH","RJ","HR"]

The following should get displayed

MP

MH

MZ

(*e*) Evaluate the following Postfix notation of expression: 2

4, 2, *, 22, 5, 6, +, /, –

Ans. (*a*) The bubble sort status in descending order is:

Original list	:	52	42	–10	60	90	20
1st pass	:	42	–10	52	60	20	90
2nd pass	:	–10	42	52	20	60	90
3rd pass	:	–10	42	20	52	60	90

(*b*) The function is:

```
def EvenSum(NUMBERS) :
    S = 0
    for i in range(len(NUMBERS)):
        if (NUMBERS[i] % 2 != 0):
            S = S + NUMBERS[i]
    print "Sum of odd numbers:", S
```

(*c*) The class is:

```
class Queue:
    Member = []
    def Addnew(self,element):
        Queue.Member.append(element)
        print "Element inserted"
    def Remove(self):
        Qlen = len(Queue.Member)
        if Qlen <= 0:
            print "Queue is empty"
        else:
            Val = Queue.Member.pop(0)
            print 'First element', Val, 'removed'
```

(*d*) The method is:

```
def MSEARCH(STATES):
    for i in STATES:
        if i[0] == 'M':
            print i
```

(*e*) The postfix notation is as follows:

Scanned Elements	Stack	Postfix
4	Push (4)	4
2	Push (2)	4, 2
*	Pop (2) and (4)	
	Calculate: 2 * 4 = 8	
	Push (8)	8
22	Push (22)	8, 22
5	Push (5)	8, 22, 5
6	Push (6)	8, 22, 5, 6
+	Pop (6) and (5)	
	Calculate: 6 + 5 = 11	
	Push (11)	8, 22, 11
/	Pop (11) and (22)	

-	Calculate: 22 / 11 = 2 Push (2) Pop (2) and (8) Calculate: 8 - 2 = 6 Push (6)	8, 2 6

∴ **Ans = 6**

Q.4. (*a*) Differentiate between file modes r+ and rb+ with respect to Python. 1

(*b*) Write a method in Phyton to read lines from a text file MYNOTES.TXT, and display those lines, which are starting with the alphabet 'K' 2

(*c*) Considering the following definition of class FACTORY, write a method in Python to search and display the content in a pickled file FACTORY.DAT, where FCTID is matching with the value '105'. 3

```
class Factory:
    def_init_(self,FID,FNAM):
        self.FCTID  =  FID    # FCTID    Factory ID
        self.FCTNM  =  FNAM   # FCTNM    Factory Name
        self.PROD   =  1000   # PROD     Production
    def Display(self):
        print self.FCTID,":",self.FCTNM,":",self.PROD
```

Ans. (*a*) In r+ mode, a disk file opens for data reading and writing where the file pointer will be at the beginning of the file.

In rb+ mode, a disk file opens for both reading and writing in binary format. The file pointer will be at the beginning of the file.

(*b*) The method is:

```
# Function to display the lines starting with 'K'
def KLines():
    if os.path.isfile("MYNOTES.TXT"):
        fb = open("MYNOTES.TXT", 'r')
        line = fb.readline() # Read a line
        while line:
            if line[0] == 'K':
                print line
            line = fb.readline() # Read a line
        fb.close()
    else:
        print "Source file does not exist."
```

(*c*) The method is:

```
def Factory105():
    FFile = "FACTORY.DAT"
```

```
if not os.path.isfile(FFile):
        print FFile, "file does not exist"
else:
        with open(FFile, 'rb') as Fobj:
                try:
                        while True:
                                F = load(Fobj)
                if F.FCTID == 105:
                                        F.Display()
                except EOFError:
                        pass
```

SECTION – C

Q.5. (*a*) Observe the following table MEMBER carefully and write the name of the RDBMS operation out of (*i*) SELECTION (*ii*) PROJECTION (*iii*) UNION (*iv*) CARTESIAN PRODUCT, which has been used to produce the output as shown in RESULT. Also, find the Degree and Cardinality of the RESULT. 2

TABLE: MEMBER

NO	MNAME	STREAM
M001	JAYA	SCIENCE
M002	ADITYA	HUMANITIES
M003	HANSRAJ	SCIENCE
M004	SHIVAK	COMMERCE

TABLE: RESULT

NO	MNAME	STREAM
M002	ADITYA	HUMANITIES

(*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: DVD

DCODE	DTITLE	DTYPE
F101	Henry Martin	Folk
C102	Dhrupad	Classical
C101	The Planets	Classical
F102	Universal Soldier	Folk
R102	A day in life	Rock

TABLE: MEMBER

MID	NAME	DCODE	ISSUEDATE
101	AGAM SINGH	R102	2017-11-30
103	ARTH JOSEPH	F102	2016-12-13
102	NISHA HANS	C101	2017-07-24

(*i*) To display all details from table MEMBER in descending order of ISSUEDATE.

(*ii*) To display the DCODE and DTITLE of all Folk Type DVDs from the table DVD.

(*iii*) To display the DTYPE and number of DVDs in each DTYPE from the table DVD.

(*iv*) To display all NAME and ISSUEDATE of those members from the table MEMBER who have DVDs issued (i.e., ISSUEDATE) in the year 2017.

(*v*) SELECT MIN (ISSUEDATE) FROM MEMBER;

(*vi*) SELECT DISTINCT DTYPE FROM DVD;

(*vii*) SELECT D.DCODE, NAME, DTITLE
FROM DVD D, MEMBER M WHERE D.DCODE=M.DCODE;

(*viii*) SELECT DTITLE FROM DVD
WHERE DTYPE NOT IN ("Folk", "Classical");

Ans. (*a*) The RDBMS operation is: SELECTION

The Degree of the table RESULT is 3 and Cardinality is 1.

(*b*) (*i*) SELECT * FROM MEMBER ORDER BY ISSUEDATE DESC;

(*ii*) SELECT DCODE, DTITLE FROM DVD WHERE DTYPE = 'Folk';

(*iii*) SELECT DTYPE, COUNT(*) FROM DVD GROUP BY DTYPE;

(*iv*) SELECT NAME, ISSUEDATE FROM MEMBER
WHERE YEAR(ISSUEDATE) = 2017;

(*v*) **MIN(ISSUEDATE)**

2016-12-13

(*vi*) **DTYPE**

Classical

Folk

Rock

(*vii*)

DCODE	NAME	DTITLE
C101	NISHA HANS	The Planets
F102	ARTH JOSEPH	Universal Soldier
R102	AGAM SINGH	A day in life

(*viii*) **DTITLE**

A day in life

Q.6. (*a*) State DeMorgan's Laws of Boolean Algebra and verify them using truth table. 2

(*b*) Draw the Logic Circuit of the following Boolean Expression using only NOR Gates: 2

(A+B) . (C+D)

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

X	Y	Z	G(X,Y,X)
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

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

E(U, V, Z, W) = Σ (2, 3, 6, 8, 9, 10, 11, 12, 13)

Ans. (*a*) The DeMorgan's laws with truth tables are:

(*i*) First law: (X + Y)' = X'.Y'

The truth table is:

X	Y	X + Y	(X + Y)'	X'	Y'	X'.Y'
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

Both the columns **(X + Y)'** and **X'.Y'** are identical, hence proved.

(*ii*) Second law: (X.Y)' = X' + Y'

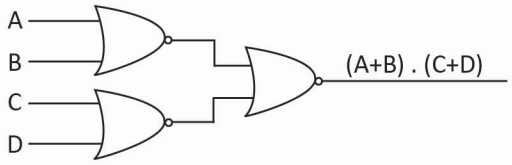
The truth table is:

X	Y	X.Y	(X.Y)'	X'	Y'	X' + Y'
0	0	0	1	1	1	1
0	1	0	1	1	0	1
1	0	0	1	0	1	1
1	1	1	0	0	0	0

Both the columns **(X.Y)'** and **X' + Y'** are identical, hence proved.

(*b*) The expression (A+B).(C+D)

The logic circuit is:



(*c*) The POS expression is: G(X, Y, Z) = (X + Y + Z)(X + Y + Z')(X + Y' + Z')(X' + Y' + Z)

(*d*) The K-map is:

UV \ ZW	00	01	11	10
00	0	1	1 (3)	1 (2)
01	4	5	7	1 (6)
11	1 (12)	1 (13)	15	14
10	1 (8)	1 (9)	1 (11)	1 (10)

E = UZ' + V'Z + U'ZW'

Q.7. (*a*) Differentiate between communication using Optical Fiber and Ethernet Cable in context of wired medium of communication technologies. 2

(*b*) Janish Khanna used a pen drive to copy files from his friend's laptop to his office computer. Soon his computer started abnormal functioning. Sometimes it would restart by itself and sometimes it would stop different applications running on it. Which of the following options out of (*i*) to (*iv*), would have caused the malfunctioning of the computer? Justify the reason for your chosen option: 2

(*i*) Computer Virus **(*ii*) Spam Mail**

(*iii*) Computer Bacteria **(*iv*) Trojan Horse**

(*c*) Ms. Raveena Sen is an IT expert and a freelancer. She recently used her skills to access the Admin password for the network server of Super Dooper Technology Ltd. and provided confidential data of the organization to its CEO, informing him about the vulnerability of their network security. Out of the following options (*i*) to (*iv*), which one most appropriately defines Ms. Sen? 2

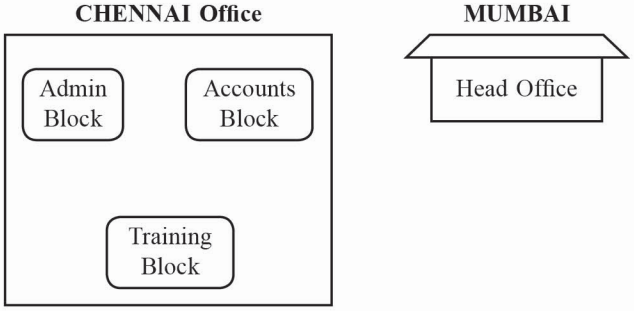
Justify the reason for your chosen option:

(*i*) Hacker **(*ii*) Cracker**

(*iii*) Operator **(*iv*) Network Admin**

(*d*) Hi Standard Tech Training Ltd. is a Mumbai based organization which is expanding its office set-up to Chennai. At Chennai office compound, they are planning to have 3 different blocks for Admin, Training and Accounts related activities. Each block has a number of computers, which are required to be connected in a network for communication, data and resource sharing.

As a network consultant, you have to suggest the best network related solutions for them for issues/problems raised by them in (*i*) to (*iv*), as per the distances between various blocks/ locations and other given parameters.



Shortest distances between various blocks/locations:

Admin Block to Accounts Block	**300 Metres**
Accounts Block to Training Block	**150 Metres**
Admin Block to Training Block	**200 Metres**
MUMBAI Head Office to CHENNAI Office	**1300 km**

Number of computers installed at various blocks are as follows :

Training Block	**150**
Accounts Block	**30**
Admin Block	**40**

(*i*) Suggest the most appropriate block/location to house the SERVER the CHENNAI office (out of the 3 blocks) to get the best and effective connectivity. Justify your answer. 1

(*ii*) Suggest the best wired medium and draw the cable layout (Block to Block) to efficiently connect various blocks within the CHENNAI office compound. 1

(*iii*) Suggest a device/software and its placement that would provide data security for the entire network of CHENNAI office. 1

(*iv*) Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the CHENNAI office. 1

Ans. (*a*) The differences are:

- The bandwidth of Optical Fibre is usually higher than that of Ethernet cable.
- Optical fiber transmits data faster than copper Ethernet cable.
- Optical fiber cable is more effective over longer distances due to the technology used to transmit data than Ethernet cable.

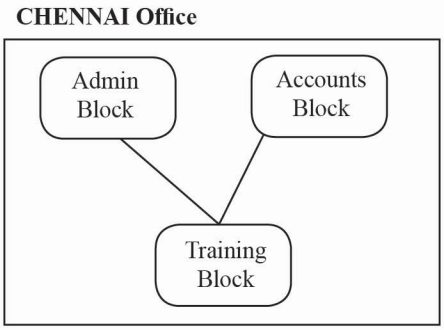
(*b*) (*ii*) **Computer Virus and (*iv*) Trojan Horse.** As pen drives is a good carrier of computer virus and Trojan Horse, which can affects the system files and starts abnormal functioning in the computer. So, computer restart by itself and sometimes it would stop functioning totally.

(*c*) (*i*) **Hacker.** A hacker is a computer expert who breaks into the computer network of an organisation person without any malicious intent.

(*d*) (*i*) The server should place in Training Block as it contains maximum number of computers.

(*ii*) The best wired medium is Optical Fibre cable.

The cable layout is:



(*iii*) Firewall should be placed with the server in Training block for the entire network of CHANDIGARH office.

(*iv*) Device name: WiFi Router

Protocol: TIP/IP