SET – 4

Series : GBM/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 **7** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

COMPUTER SCIENCE

*Time allowed : **3** hours* *Maximum marks : **70***

General Instructions :

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

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

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

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

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

SECTION – A

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

1. (a) Write the type of C++ tokens (keywords and user defined identifiers) from the following : **2**

(i) `For`

(ii) `delete`

(iii) `default`

(iv) `Value`

(b) Anil typed the following C++ code and during compilation he found four errors as follows : **1**

(i) Function strlen should have a prototype

(ii) Undefined symbol cout

(iii) Undefined symbol endl

(iv) Function getchar should have a prototype

On asking his teacher told him to include necessary header files in the code. Write the names of the header files, which Anil needs to include, for successful compilation and execution of the following code :

```
void main()
{
    char S[] = "Hello";
    for(int i = 0; i<strlen(S); i++)
        S[i] = S[i]+1;
    cout<<S<<end1;
    getchar();
}
```

(c) Rewrite the following C++ code after removing any/all syntactical errors with each correction underlined. **2**

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

```
void main()
{
    cout<<"Enter an integer”;
    cin>>N;
    switch(N%2)

        case 0 cout<<"Even"; Break;
        case 1 cout<<"Odd"; Break;
}
```

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

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

```
#define Big(A,B) (A>B)?A+1:B+2
void main()
{
    char W[] = "Exam";
    int L=strlen(W);
    for(int i=0; i<L-1; i++)
        W[i] = Big(W[i],W[i+1]);
    cout<<W<<end1;
}
```

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

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

```
void main()
{
    int A[]={10,12,15,17,20,30};
    for(int i = 0; i<6; i++)
    {
        if(A[i]%2==0)
           A[i] /= 2;
        else if(A[i]%3==0)
           A[i] /= 3;
        if(A[i]%5==0)
           A[i] /=5;
    }
for(i = 0; i<6; i++)
    cout<<A[i]<<"#";
}
```

(f) Look at the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the maximum values that can be assigned to each of the variables R and C. **2**

Note :

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

```
void main()
{
    randomize();
    int R=random(3),C=random(4);
    int MAT[3][3] = {{10,20,30},{20,30,40},{30,40,50}};
    for(int I=0; I<R; I++)
    {
        for(int J=0; J<C; J++)
           cout<<MAT[I][J]<<" ";
        cout<<end1;
    }
}
```

(i)	(ii)
10 20 30 20 30 40 30 40 50	10 20 30 20 30 40
(iii)	(iv)
10 20 20 30	10 20 20 30 30 40

2. (a) Differentiate between private and public members of a class in context of Object Oriented Programming. Also give a suitable example illustrating accessibility/non-accessibility of each using a class and an object in C++. **2**

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

```
class EXAM
{
    long Code;
    char EName[20];
    float Marks;
public:
    EXAM()                  //Member Function 1
    {
        Code=100;strcpy(EName,"Noname");Marks=0;
    }
    EXAM(EXAM &E)           //Member Function 2
    {
        Code=E.Code+1;
        strcpy(EName,E.EName);
        Marks=E.Marks;
    }
};
void main()
{
    _____________           //Statement 1
    _____________           //Statement 2
}
```

(i) Which Object Oriented Programming feature is illustrated by the Member Function 1 and Member Function 2 together in the class EXAM ? **1**

(ii) Write Statement 1 and Statement 2 to execute Member Function 1 and Member Function 2 respectively. **1**

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

Private Members

```
- RingNumber  // data member of integer type
- Radius      // data member of float type
- Area        // data member of float type
- CalcArea()  // Member function to calculate and assign
              // Area as 3.14 * Radius*Radius
```

Public Members

```
- GetArea()   // A function to allow user to enter values of
              // RingNumber and Radius. Also, this
              // function should call CalcArea() to calculate
              // Area

- ShowArea()  // A function to display RingNumber, Radius
              // and Area
```

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

```
class One
{
    int A1;
protected:
    float A2;
public:
    One();
    void Get1(); void Show1();
};
class Two : private One
{
    int B1;
protected:
    float B2;
public:
    Two();
    void Get2();
    void Show();
};
Class Three : public Two
{
    int C1;
public:
    Three();
    void Get3();
    void Show();
};
void main()
{
    Three T;      //Statement 1
    __________;   //Statement 2
}
```

(i) Which type of Inheritance out of the following is illustrated in the above example ?

– Single Level Inheritance, Multilevel Inheritance, Multiple Inheritance

(ii) Write the names of all the member functions, which are directly accessible by the object T of class Three as declared in main( ) function.

(iii) Write Statement 2 to call function Show( ) of class Two from the object T of class Three.

(iv) What will be the order of execution of the constructors, when the object T of class Three is declared inside main ( ) ?

3. (a) Write the definition of a function Reverse(int Arr[], int N) in C++, which should reverse the entire content of the array Arr having N elements, without using any other array. **3**

Example : if the array Arr contains

13	10	15	20	5

Then the array should become

5	20	15	10	13

Note :

- The function should only rearrange the content of the array.
- The function should not copy the reversed content in another array.
- The function should not display the content of the array.

(b) Write definition for a function ADDMIDROW(int MAT[][10],int R,int C) in C++, which finds sum of the middle row elements of the matrix MAT (Assuming C represents number of Columns and R represents number of rows, which is an odd integer). **2**

For example, if the content of array MAT having R as 3 and C as 5 is as follows :

1	2	3	4	5
2	1	3	4	5
3	4	1	2	5

The function should calculate the sum and display the following :

Sum of Middle Row : 15

(c) T[25][30] is a two dimensional array, which is stored in the memory along the row with each of its element occupying 2 bytes, find the address of the element T[10] [15], if the element T[5] [10] is stored at the memory location 25000. **3**

(d) Write the definition of a member function ADDMEM( ) for a class QUEUE in C++, to add a MEMBER in a dynamically allocated Queue of Members considering the following code is already written as a part of the program. **4**

```
struct Member
{
    int MNO;
    char MNAME[20];
    Member *Next;
};
Class QUEUE
{
    Member *Rear,*Front;
public:
    QUEUE(){Rear=NULL;Front=NULL;}
    void ADDMEM();
    void REMOVEMEM();
    ~QUEUE();
};
```

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

P + (Q – R) * S / T

4. (a) Aditi has used a text editing software to type some text. After saving the article as **WORDS.TXT**, she realised that she has wrongly typed alphabet J in place of alphabet I everywhere in the article. **3**

Write a function definition for **JTOI()** in C++ that would display the corrected version of entire content of the file **WORDS.TXT** with all the alphabets "J" to be displayed as an alphabet "I" on screen.

Note : Assuming that **WORD.TXT** does not contain any J alphabet otherwise.

Example :

If Aditi has stored the following content in the file **WORDS.TXT :**

```
WELL, THJS JS A WORD BY JTSELF. YOU COULD STRETCH
THJS TO BE A SENTENCE
```

The function **JTOI( )** should display the following content :

```
WELL, THIS IS A WORD BY ITSELF. YOU COULD STRETCH
THIS TO BE A SENTENCE
```

(b) Write a definition for function COUNTDEPT( ) in C++ to read each object of a binary file TEACHERS.DAT, find and display the total number of teachers in the department MATHS. Assume that the file TEACHERS.DAT is created with the help of objects of class TEACHERS, which is defined below : **2**

```
class TEACHERS
{
    int TID; char DEPT[20];
public:
    void GET()
    {
        cin>>TID;gets(DEPT);
    }
    void SHOW()
    {
        cout<<TID<<":"<<DEPT<<end1;
    }
    char *RDEPT(){return DEPT;}
};
```

(c) Find the output of the following C++ code considering that the binary file BOOK.DAT exists on the hard disk with a data of 200 books. **1**

```
class BOOK
{
    int BID;char BName[20];
public:
    void Enter();void Display();
};
void main()
{
    fstream InFile;
    InFile.open("BOOK.DAT",ios::binary|ios::in);
    BOOK B;
    InFile.seekg(5*sizeof(B));
    InFile.read((char*)&B, sizeof(B));
    cout<<"Book Number:"<<InFile.tellg()/sizeof(B) + 1;
    InFile.seekg(0,ios::end);
    cout<<" of "<<InFile.tellg()/sizeof(B)<<end1;
    InFile.close();
}
```

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

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) **SOUTHNORTHWEST**
(iii) **SOUTH**	(iv) **EASTWESTNORTH**

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

(b) **2**

```
class Test:
    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.

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,+,/,-
```

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

(b) Write a method in Phyton 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 in 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
```

SECTION – C

(For all the Candidates)

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");
```

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**

$F(X,Y,Z,W) = \Sigma(0,1,2,3,4,5,10,11,14)$

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

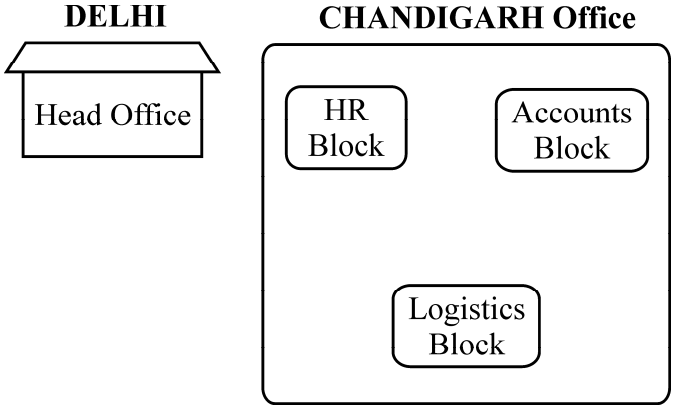
(b) Amit used a pen drive to copy files from his friend's laptop to his office computer. Soon his office computer started abnormal functioning. Sometimes it would restart by itself and sometimes it would stop functioning totally. Which of the following options out of (i) to (iv), would have caused the 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 in 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

CBSE AISSCE 2016-2017 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 the similar meaning
- All programming questions have to be answered with respect to C++ Language / Python only
- In C++ / Python, ignore case sensitivity for identifiers (Variable / Functions / Structures / Class Names)
- In Python indentation is mandatory, however, number of spaces used for indenting may vary
- In SQL related questions – both ways of text/character entries should be acceptable for Example: "AMAR" and 'amar' both are acceptable.
- In SQL related questions – 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.
- In SQL related questions – semicolon should be ignored for terminating the SQL statements
- In SQL related questions, ignore case sensitivity.

SECTION A - (Only for candidates, who opted for C++)

1	(a)	Write the type of C++ tokens (keywords and user defined identifiers) from the following: **(i) For** **(ii) delete** **(iii) default** **(iv) Value**	2
	Ans	**(i) For - user defined identifier** **(ii) delete - keyword** **(iii) default - keyword** **(iv) Value - user defined identifier**	
		(½ Mark for writing each correct keywords) ***(½ Mark for writing each correct user defined identifiers)***	

	(b)	Anil typed the following C++ code and during compilation he found four errors as follows:
		(i) Function strlen should have a prototype
		(ii) Undefined symbol cout
		(iii) Undefined symbol endl
		(iv) Function getchar should have a prototype
		On asking his teacher told him to include necessary header files in the code. Write the names of the header files, which Anil needs to include, for successful compilation and execution of the following code:
		`void main()`
		`{`
		`  char S[] = "Hello";`
		`  for(int i = 0; i<strlen(S); i++)`
		`  S[i] = S[i]+1;`
		`  cout<<S<<endl;`
		`  getchar();`
		`}`
			1

	Ans	**iostream.h or iomanip.h or fstream.h** **string.h** **stdio.h**	
		(½ Mark each for writing any two correct header files) ***NOTE:*** ***Ignore additional header file(s)***	
	(c)	Rewrite the following C++ code after removing any/all syntactical errors with each correction underlined. Note: Assume all required header files are already being included in the program. **void main()** **{** **cout<<"Enter an integer";** **cin>>N;** **switch(N%2)** **case 0 cout<<"Even"; Break;** **case 1 cout<<"Odd" ; Break;** **}**	2

	Ans	**void main()**
		{
		int N; // Error 1
		cout<<"Enter an integer";
		cin>>N;
		switch(N%2)
		{ // Error 2 (i)
		case 0: // Error 3 (i)
		cout<<"Even"; break; // Error 4 (i)
		case 1: // Error 3 (ii)
		cout<<"Odd" ; break; // Error 4 (ii)
		} // Error 2 (ii)
		}	

		(½ Mark for correcting Error 1) ***(½ Mark for correcting Error 2(i) and Error 2(ii))*** ***(½ Mark for correcting Error 3(i) and Error 3(ii))*** ***(½ Mark for correcting Error 4(i) and Error 4(ii))*** ***OR*** ***(1 Mark for identifying all the errors without corrections)***	
	(d)	Find and write the output of the following C++ program code: Note: Assume all required header files are already included in the program. **#define Big(A,B) (A>B)?A+1:B+2** **void main()**	2

		{
		char W[] = "Exam";
		int L=strlen(W);
		for(int i =0; i<L-1; i++)
		W[i] = Big(W[i],W[i+1]);
		cout<<W<<endl;
		}	

	Ans	zyom	
		(½ Mark for writing each correct value) *Deduct ½ Mark for writing the values in different lines*	

	(e)	Find and write the output of the following C++ program code:
		Note: Assume all required header files are already being included in the program.
		
		void main()
		{
		int A[]={10,12,15,17,20,30};
		for(int i = 0; i<6; i++)
		{
		if(A[i]%2==0)
		A[i] /= 2;
		else if(A[i]%3==0)
		A[i] /= 3;
		if(A[i]%5==0)
		A[i] /= 5;
		}
		for(i = 0; i<6; i++)
		cout<<A[i]<<"#";
		}
			3

	Ans	1#6#1#17#2#3#	
		(½ Mark for writing each correct value) *Note: Deduct ½ Mark for not considering any/all # as separator and or writing the values in different lines*	

	(f)	Look at the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the maximum values that can be assigned to each of the variables R and C.
		Note:
		● Assume all the required header files are already being included in the code.
		● The function random(n) generates an integer between 0 and n-1
		void main()
		{
		randomize();
			2

```
  int R=random(3),C=random(4);
  int MAT[3][3] = {{10,20,30},{20,30,40},{30,40,50}};
  for(int I=0; I<R; I++)
  {
     for(int J=0; J<C; J++)
        cout<<MAT[I][J]<<"  ";
     cout<<endl;
  }
}
```

(i)	(ii)
10 20 30 20 30 40 30 40 50	10 20 30 20 30 40
(iii)	**(iv)**
10 20 20 30	10 20 20 30 30 40

Ans ***(ii) and (iii)***
Max Value of R:2
Max Value of C:3

(1 Mark for writing the correct options)
NOTE: No marks to be awarded for writing any other option or any other combination

(½ Mark for writing correct Maximum value of R)
(½ Mark for writing correct Maximum value of C)

2. (a) Differentiate between private and public members of a class in context of Object Oriented Programming. Also give a suitable example illustrating accessibility/non-accessibility of each using a class and an object in C++. 2

Ans

private	public
Implicit Visibility Mode Not accessible by the objects of class	Explicit Visibility Mode Accessible by the objects of class

Example:

```
class A
{
    int x;      //private Member
public:
    void In();//public member
};
void main()
{
  A obja;
  cin>>obja.x;//Not Accessible
  obja.In();//accessible
}
```

		OR Any other correct example demonstrating difference between private and public members of a class	
		(Full 2 Marks for any one correct difference between private and public members of a class using a suitable code in C++) **OR** ***(1 Mark for writing correct difference between private and public members in a class without example)***	

	(b)	Observe the following C++ code and answer the questions (i) and (ii).
		Note: Assume all necessary files are included.
		`class EXAM`
		`{`
		`  long Code;`
		`  char EName[20];`
		`  float Marks;`
		`public:`
		`  EXAM()  //Member Function 1`
		`  {`
		`  Code=100;strcpy(EName,"Noname");Marks=0;`
		`  }`
		`  EXAM(EXAM &E)  //Member Function 2`
		`  {`
		`  Code=E.Code+1;`
		`  strcpy(EName,E.EName);`
		`  Marks=E.Marks;`
		`  }`
		`};`
		`void main()`
		`{`
		`  _____  //Statement 1`
		`  _____  //Statement 2`
		`}`	

	(i)	Which Object Oriented Programming feature is illustrated by the Member Function 1 and Member Function 2 together in the class EXAM?	1
	Ans	**Polymorphism OR Constructor overloading OR Function Overloading**	
		(1Mark for mentioning the correct concept name)	
	(ii)	Write Statement 1 and Statement 2 to execute Member Function 1 and Member Function 2 respectively.	1
	Ans	`EXAM E1;` //Statement 1 `EXAM E2(E1);` //Statement 2 **OR** `EXAM E2=E1;` //Statement 2	

		(½ Mark for writing statement 1 correctly) *(½ Mark for writing statement 2 correctly)*	

	(c)	Write the definition of a class RING in C++ with following description:
		Private Members
		`- RingNumber // data member of integer type`
		`- Radius // data member of float type`
		`- Area // data member of float type`
		`- CalcArea() // Member function to calculate and assign`
		`// Area as 3.14 * Radius*Radius`
		Public Members
		`- GetArea() // A function to allow user to enter values of`
		`// RingNumber and Radius. Also, this`
		`// function should call CalcArea() to calculate`
		`// Area`
		`- ShowArea() // A function to display RingNumber, Radius`
		`// and Area`
			4

	Ans	`class RING`
		`{`
		`int RingNumber ;`
		`float Radius ;`
		`float Area ;`
		`void CalcArea(){Area=3.14*Radius*Radius;}`
		`public:`
		`void GetArea();`
		`void ShowArea();`
		`};`
		`void RING::GetArea()`
		`{`
		`cin>>RingNumber>>Radius;`
		`CalcArea();`
		`}`
		`void RING::ShowArea()`
		`{`
		`cout<<RingNumber<<" "<<Radius<<" "<<Area<<endl;`
		`}`	

		(½ Mark for declaring class header correctly) *(½ Mark for declaring data members correctly)* *(1 Mark for defining CalcArea() correctly)* *(½ Mark for taking inputs of RingNumber and Radius in GetArea())* *(½ Mark for invoking CalcArea() inside GetArea())* *(½ Mark for defining ShowArea() correctly)* *(½ Mark for correctly closing class declaration with a semicolon ;)* *NOTE:* *Marks to be awarded for defining the member functions inside or outside the class*	

	(d)	Answer the questions (i) to (iv) based on the following:
		`class One`
		`{`
			4

```
  int  A1;
protected:
  float A2;
public:
  One();
  void Get1(); void Show1();
};
class Two : private One
{
  int B1;
protected:
  float B2;
public:
  Two();
  void Get2();
  void Show();
};
class Three : public Two
{
  int C1;
public:
  Three();
  void Get3();
  void Show();
};
void main()
{
   Three T;          //Statement 1
   ____________________;//Statement 2
}
```

(i) Which type of Inheritance out of the following is illustrated in the above example?
-Single Level Inheritance, Multilevel Inheritance, Multiple Inheritance

Ans **Multilevel Inheritance**

(1 Mark for writing correct option)

(ii) Write the names of all the member functions, which are directly accessible by the object T of class Three as declared in main() function.

Ans
```
Get3(),Show() of class Three
Get2(),Show() of class Two
```
OR
```
Get3(),Show() OR Three::Show()
Get2(),Two::Show()
```

(1 Mark for writing all correct function names)

NOTE:
- ***Marks not to be awarded for partially correct answer***
- ***Ignore the mention of Constructors***

(iii) Write Statement 2 to call function Show() of class Two from the object T of class Three.

	Ans	`T.Two::Show()`	
		(1 Mark for writing Statement 2 correctly)	
	(iv)	What will be the order of execution of the constructors, when the object T of class Three is declared inside main()?	
	Ans	***One,Two, Three***	
		(1 Mark for writing correct order) ***NOTE:*** ● ***No Marks to be awarded for any other combination/order.*** ● ***Names of the constructor/class without parenthesis is acceptable***	
3	(a)	Write the definition of a function Reverse(int Arr[], int N) in C++, which should reverse the entire content of the array Arr having N elements, without using any other array. Example: if the array Arr contains 13 | 10 | 15 | 20 | 5 Then the array should become 5 | 20 | 15 | 10 | 13 NOTE: ● The function should only rearrange the content of the array. ● The function should not copy the reversed content in another array. ● The function should not display the content of the array.	3

	Ans	`void Reverse(int Arr[],int N)`
		`{`
		`  for (int I=0;I<N/2;I++)`
		`  {`
		`  int T=Arr[I];`
		`  Arr[I]=Arr[N-I-1];`
		`  Arr[N-I-1]=T;`
		`  }`
		`}`
		OR
		Any other correct alternative code in C++	

		(1 ½ Mark for correctly writing the loop) ***(1 ½ Mark for correctly writing the logic for reversing the content)***	
	(b)	Write definition for a function ADDMIDROW(int MAT[][10],int R,int C) in C++, which finds sum of the middle row elements of the matrix MAT (Assuming C represents number of Columns and R represents number of rows, which is an odd integer). For example, if the content of array MAT having R as 3 and C as 5 is as follows: 1 | 2 | 3 | 4 | 5 **2 | 1 | 3 | 4 | 5** 3 | 4 | 1 | 2 | 5	2

		The function should calculate the sum and display the following: Sum of Middle Row: 15	

	Ans	`void ADDMIDROW(int MAT[][10],int R,int C)`
		`{`
		`  int MIDR=0;`
		`  for (int J=0;J<C;J++)`
		`  MIDR+=MAT[R/2][J];`
		`  cout<<"Sum of Middle Row:"<<MIDR<<endl;`
		`}`
		OR
		Any other correct alternative code in C++	

		(½ Mark for correctly writing the loop) ***(1 Mark for adding middle row elements)*** ***(½ Mark for displaying the sum of middle row elements)***	
	(c)	T[25][30] is a two dimensional array, which is stored in the memory along the row with each of its element occupying 2 bytes, find the address of the element T[10][15], if the element T[5][10] is stored at the memory location 25000.	3

	Ans	`LOC(T[I][J])  = Base(T)+W*(NC*I+J)`
		`LOC(T[5][10]) = Base(T)+2*(30*5+10)`
		`25000  = Base(T)+2*(30*5+10)`
		`Base(T)  = 25000 - 2*(160)`
		`Base(T)  = 25000 - 320`
		`Base(T)  = 24680`
		
		`LOC(T[10][15])= 24680 + 2*(30*10+15)`
		`  = 24680 + 2*(315)`
		`  = 24680 + 630`
		`  = 25310`
		OR
		`LOC(T[10][15]) = LOC(T[5][10]) + 2(30*(10-5) + (15-10))`
		`  = 25000 + 2(150 + 5)`
		`  = 25000 + 2(155)`
		`  = 25000 + 310`
		`  = 25310`	

		(1 Mark for writing correct formula (for Row major) OR substituting formula with correct values) ***(1Mark for correct calculation)*** ***(1 Mark for final correct address)***	

	(d)	Write the definition of a member function ADDMEM() for a class QUEUE in C++, to add a MEMBER in a dynamically allocated Queue of Members considering the following code is already written as a part of the program.
		
		`struct Member`
		`{`
		`  int MNO;`
		`  char MNAME[20];`
		`  Member *Next;`
			4

```
};
class QUEUE
{
  Member *Rear,*Front;
public:
  QUEUE(){Rear=NULL;Front=NULL;}
  void ADDMEM();
  void REMOVEMEM();
  ~QUEUE();
};
```

ANS

```
void QUEUE::ADDMEM()
{
  Member *T;
  T=new Member;
  cin>>T->MNO;
  gets(T->MNAME);
  T->Next=NULL;
  if (Rear==NULL)
  {
    Rear=T;Front=T;
  }
  else
  {
    Rear->Next=T;
    Rear=T;
  }
}
```

OR

Any other equivalent code in C++

(1 Mark for creating a new Node)
(1 Mark for accepting values of MNO and MNAME)
(½ Mark for checking EMPTY condition)
(½ Mark for assigning NULL to Rear and Front as T)
(½ Mark for connecting Rear with T)
(½ Mark for assigning Rear as T)

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

P + (Q - R) * S / T

Ans **(P+(((Q-R)*S)/T))**

INFIX	STACK	POSTFIX
P		P
+	+	P
Q	+	PQ
-	+-	PQ
R	+-	PQR

)	+	PQR-
*	+*	PQR-
S	+*	PQR-S
)	+	PQR-S*
/	+/	PQR-S*
T	+/	PQR-S*T
)	+	PQR-S*T/
)		PQR-S*T/+

OR

INFIX	STACK	POSTFIX
(	(	
P	(	P
+	(+	P
(	(+(	P
Q	(+(	PQ
-	(+(-	PQ
R	(+(-	PQR
)	(+	PQR-
*	(+*	PQR-
S	(+*	PQR-S
/	(+/	PQR-S*
T	(+/	PQR-S*T
)		PQR-S*T/+

(½ Mark for conversion upto each operator illustrating through stack)
OR
(1 Mark for only the final answer as* PQR-S*T/+*)

4. (a) Aditi has used a text editing software to type some text. After saving the article as WORDS.TXT, she realised that she has wrongly typed alphabet J in place of alphabet I everywhere in the article. [3]

Write a function definition for JTOI() in C++ that would display the corrected version of entire content of the file WORDS.TXT with all the alphabets "J" to be displayed as an alphabet "I" on screen.
Note: Assuming that WORD.TXT does not contain any J alphabet otherwise.
Example:
If Aditi has stored the following content in the file WORDS.TXT:

```
WELL, THJS JS A WORD BY JTSELF. YOU COULD STRETCH THJS TO BE
A SENTENCE
```

The function JTOI() should display the following content:

```
WELL, THIS IS A WORD BY ITSELF. YOU COULD STRETCH THIS TO BE
```

		A SENTENCE	

	Ans	void JTOI()
		{
		char ch;
		ifstream F("WORDS.TXT");
		while(F.get(ch))
		{
		if(ch=='J')
		ch='I';
		cout<<ch;
		}
		F.close(); //IGNORE
		}
		OR
		Any other correct function definition
		OR
		fstream F;
		F.open("WORDS.TXT", ios::in);
		OR
		fstream F("WORDS.TXT", ios::in);	

		(1 Mark for opening WORDS.TXT / WORD.TXT correctly) *(1 Mark for reading each character (using any method) from the file)* *(1 Mark for displaying 'I' in place of 'J')*	

	(b)	Write a definition for function COUNTDEPT( ) in C++ to read each object of a binary file TEACHERS.DAT, find and display the total number of teachers in the department MATHS. Assume that the file TEACHERS.DAT is created with the help of objects of class TEACHERS, which is defined below:
		class TEACHERS
		{
		int TID; char DEPT[20];
		public:
		void GET()
		{
		cin>>TID;gets(DEPT);
		}
		
		void SHOW()
		{
		cout<<TID<<":"<<DEPT<<endl;
		}
		char *RDEPT(){return DEPT;}
		};
			2

	Ans	void COUNTDEPT()
		{
		ifstream F;
		F.open("TEACHERS.DAT",
		ios::binary);
		int count=0;
		Teachers obj;
		OR
		fstream F;
		F.open("TEACHERS.DAT",
		ios::binary|ios::in);	

```
  while(F.read((char*)&obj,
                  sizeof(obj)))
  {
     if(strcmp(obj.RDEPT(),"MATHS")==0)
        count++;
  }
  cout<<"Number of MATHS teachers :"<<count<<endl;
  F.close();  //IGNORE
}
```

OR

Any other correct function definition

(½ Mark for opening TEACHERS.DAT correctly)
(½ Mark for reading records from TEACHERS.DAT)
(½ Mark for comparing DEPT of type MATHS(ignore case sensitive checking) with strcmp or strcmpi)
(½ Mark for displaying the incremented count for matching records)

(c) Find the output of the following C++ code considering that the binary file BOOK.DAT exists on the hard disk with a data of 200 books. — 1

```
class BOOK
{
  int BID;char BName[20];
public:
  void Enter();void Display();
};
void main()
{
  fstream InFile;
  InFile.open("BOOK.DAT",ios::binary|ios::in);
  BOOK B;
  InFile.seekg(5*sizeof(B));
  InFile.read((char*)&B, sizeof(B));
  cout<<"Book Number:"<<InFile.tellg()/sizeof(B) + 1;
  InFile.seekg(0,ios::end);
  cout<<" of "<<InFile.tellg()/sizeof(B)<<endl;
  InFile.close();
}
```

Ans `Book Number: 7 of 200`

(½ Mark for displaying correct value of InFile.tellg()/sizeof(B) + 1)
(½ Mark for displaying correct value of InFile.tellg()/sizeof(B))

SECTION B - (Only for candidates, who opted for Python)

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`

Ans (i) `total`

		(2 marks for correct option) *NOTE:* *Deduct ½ mark each for wrong options*	
	(b)	Name the Python Library modules which need to be imported to invoke the following functions **(i)** `ceil()` **(ii)** `randint()`	1
	Ans	**(i)** `math` **(ii)** `random` *(½ Mark for writing each correct Library modules)* *NOTE:* *Ignore any other Library modules, if mentioned*	

	(c)	Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code
		`TEXT=""GREAT`
		`DAY""`
		`for T in range[0,7]:`
		`  print TEXT(T)`
		`print T+TEXT`
			2

	Ans	`TEXT="GREAT"`
		`DAY =""`
		`for T in range(0,7):`
		`  print TEXT[T]`
		`print T,TEXT`
		Also range(0,7) will give a runtime error as the index is out of range. It should be range(0,5)
		(½ Mark for each correction, not exceeding 2 Marks)
		OR
		(1 mark for identifying the errors, without suggesting corrections)	

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

	Ans	`41.0`
		`32.0`
		`15.0`
		`94.0`
		(½ mark for each correct line of output)
		NOTE: Deduct ½ Mark for writing the answer in same line. Deduct ½ Mark for writing numbers without decimal point	

	(e)	Find and write the output of the following python code:
		`class ITEM:`
		`  def __init__(self,I=101,N="Pen",Q=10): #constructor`
			3

```
      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()
```

Ans

```
102 : Sharpener # 85
101 : Pen # 20
100 : Eraser # 75
```

(1 mark for each correct line of output)
NOTE:
- *Deduct ½ Mark for not writing any or all ':' or '#' symbol(s)*
- *Deduct ½ Mark for not considering any or all line breaks 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 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) SOUTHNORTHWEST**
(iii) SOUTH	**(iv) EASTWESTNORTH**

Ans **(i) SOUTHNORTH**

Maximum value of N = 3
Minimum value of N = 1

(1 mark for correct option)
NOTE: No marks to be awarded for writing any other option or any other combination

(½ each for maximum and minimum value of N)

2	(a)	List four characteristics of Object Oriented programming.	2
	Ans	**Encapsulation** **Data Hiding** **Abstraction** **Inheritance** **Polymorphism** ***(½ mark for each characteristic upto four characteristics)***	

	(b)	`class Test:`
		`  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.
			2

	Ans	i) Function 1 is the constructor which gets executed automatically as soon as the object of the class is created. Function 2 is a member function which has to be called to assign the values to rollno and marks. ii) Function 1 `E1=Test(1,95) # Any values in the parameter` Function 2 `E1.assign(1,95) # Any values in the parameter` ***(1 mark for correct difference)*** ***(½ mark for each statement for executing Function 1 and function 2)***	

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

	Ans	`class RING:  # OR  class RING( ): OR class RING(Object):`
		`  def __init__(self):`
		`  self.RingID=101`
		`  self.Radius=10`
		`  self.Area=0`
		`  def AreaCal(self):`
		`  self.Area=3.14*self.Radius*self.Radius`
		
		`  def NewRing(self):`
		`  self.RingID=input("Enter RingID")`
		`  self.Radius=input("Enter radius")`
		`  self.AreaCal()  # OR AreaCal(self)`
		`  def ViewRing(self):`
		`  print self.RingID`
		`  print self.Radius`
		`  print self.Area`
		
		`def __init__(self,Ri,Ra,A):`
		`#Any variable instead of Ri, Ra, A may be used`
		`  self.RingID=Ri`
		`  self.Radius=Ra`
		`  self.Area=A`
		
		(½ Mark for correct syntax for class header)
		(½ Mark for correct declaration of instance attributes)
		(1 Mark for correct definition of AreaCal() function)
		(1 Mark for correct definition of NewRing() with invocation of AreaCal( ))
		(1 Mark for correct definition of ViewRing())
		NOTE:
		Deduct ½ Mark if AreaCal() is not invoked properly inside NewRing() function	

	(d)	Differentiate between static and dynamic binding in Python? Give suitable examples of each.	2
	Ans	Static Binding: It allows linking of function call to the function definition during compilation of the program. Dynamic Binding: 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. Dynamic binding of functions makes the programs more flexible. ***(1 mark for each correct explanation of static and dynamic binding)*** ***OR*** ***(1 for each correct example of static and dynamic binding)***	
	(e)	Write two methods in Python using concept of Function Overloading (Polymorphism) to perform the following operations: (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.	2

	Ans	`def Area(side):`
		`  print side*side`
		`def Area(length,breadth):`
		`  print length*breadth`	

NOTE: Python does not support function overloading "as illustrated in the example shown above". If you run the code, the second Area(B,H) definition will overwrite/override the first one.

(1 mark for each function definition)
OR
(Full 2 Marks for mentioning Python does not support function overloading)

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

Ans

I Pass

152	**104**	-100	604	190	204
152	**104**	**-100**	604	190	204
152	104	**-100**	**604**	190	204
152	104	604	**-100**	**190**	204
152	104	604	190	**-100**	**204**
152	104	604	190	204	-100

II Pass

152	**104**	604	190	204	-100
152	**104**	**604**	190	204	-100
152	604	**104**	**190**	204	-100
152	604	190	**104**	**204**	-100
152	604	190	204	104	-100

III Pass

152	**604**	190	204	104	-100
604	**152**	**190**	204	104	-100
604	190	**152**	**204**	104	-100
604	190	204	152	104	-100

(1 mark for last set of values of each correct pass)

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

Ans

```
def OddSum(NUMBERS):
    n=len(NUMBERS)
    s=0
    for i in range(n):
        if (i%2!=0):
            s=s+NUMBERS[i]
    print(s)
```

(½ mark for finding length of the list)
(½ mark for initializing s (sum) with 0)
(½ mark for reading each element of the list using a loop)
(½ mark for checking odd location)
(½ mark for adding it to the sum)
(½ mark for printing or returning the value)

	(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

	Ans	`class stack:`
		`  Book=[]`
		`  def Addnew(self):`
		`  Name=input("Enter Book Name :")`
		`  stack.Book.append(Name)`
		`  def Remove(self):`
		`  if (stack.Book==[]):`
		`  print "Stack Empty"`
		`  else:`
		`  print "Deleted Book is : ",stack.Book.pop()`	

		(½ mark for Addnew header) ***(½ mark for accepting a Book from user)*** ***(1 mark for adding value in list)*** ***(½ mark for Remove header)*** ***(½ mark for checking empty list condition)*** ***(½ mark for displaying Book getting removed)*** ***(½ mark for removing Book)*** ***NOTE:*** ***Marks not to be deducted for methods written without using a class***	
	(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. For example: If the list CITIES contains `["AHMEDABAD","CHENNAI","NEW DELHI","AMRITSAR","AGRA"]` The following should get displayed **AHEMDABAD** **AMRITSAR** **AGRA**	2

	Ans	`def AFIND(CITIES):`
		`  for i in CITIES:`
		`  if i[0]=='A':`
		`  print i`
		(½ mark function header)
		(½ mark for loop)
		(½ mark for checking condition of first letter A)
		(½ mark for displaying value)	

	(e)	Evaluate the following Postfix notation of expression: `2,3,*,24,2,6,+,/,-`	2
	Ans		

Element	Stack Contents
2	2
3	2, 3
*	6
24	6, 24
2	6, 24, 2

		<table><tr><td>6</td><td>6, 24, 2, 6</td></tr><tr><td>+</td><td>6, 24, 8</td></tr><tr><td>/</td><td>6, 3</td></tr><tr><td></td><td>3</td></tr></table> **Answer: 3** ***(½ Mark for evaluation till each operator) OR (1 Mark for only writing the Final answer without showing stack status)***	
4	**(a)**	Differentiate between file modes **r+** and **w+** with respect to Python.	1
	Ans	• **r+ Opens a file for both reading and writing. The file pointer placed at the beginning of the file.** • **w+ Opens a file for both writing and reading. Overwrites the existing file if the file exists. If the file does not exist, creates a new file for reading and writing.** ***(1 mark for one of the correct difference) OR (½ Mark for each correct use of r+ and w+)***	
	(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

	Ans	`def display():`
		`  file=open('DIARY.TXT','r')`
		`  line=file.readline()`
		`  while line:`
		`  if line[0]=='P' :`
		`  print line`
		`  line=file.readline()`
		`  file.close()  #IGNORE`
		(½ Mark for opening the file) (½ Mark for reading all lines) (½ Mark for checking condition for line starting with P) (½ Mark for displaying line)	

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

	Ans	`import pickle`
		`def ques4c( ):`
		`  f=Factory( )`
		`  file=open('COMPANY.DAT','rb')`
		`  try:`	

```
    while True:
      f=pickle.load(file)
      if f.CompID==1005:
        f.Display()
  except EOF Error:
    pass
  file.close()  #IGNORE
```

(½ Mark for correct function header)
(½ Mark for opening the file COMPANY.DAT correctly)
(½ Mark for correct loop)
(½ Mark for correct load( ))
(½ Mark for correct checking of CompID)
(½ Mark for displaying the record)

SECTION C - (For all the candidates)

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	RISHAB	ENGINEERING

RESULT

NO	NAME
C3	ROHAN

Ans **(i) SELECTION and (ii) PROJECTION**
OR
(i) SELECTION
OR
(ii) PROJECTION

DEGREE = 2
CARDINALITY = 1

(1 Mark for writing the correct RDBMS operation as any one of the given options)
(½ Mark for writing correct degree)
(½ Mark for writing correct cardinality)

(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	MNANE	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.

Ans
```
SELECT * FROM MEMBER ORDER BY ISSUEDATE DESC;
```

(½ Mark for correct SELECT statement)
(½ Mark for correct ORDER BY clause)

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

Ans
```
SELECT Code,BNAME FROM BOOK WHERE TYPE='Fiction';
OR
SELECT BNO,BNAME FROM BOOK WHERE TYPE='Fiction';
```

(½ Mark for correct SELECT statement)
(½ Mark for correct WHERE clause)
NOTE:
Full 1 Mark for mentioning BNO does not exist in table BOOK

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

Ans
```
SELECT COUNT(*),TYPE FROM BOOK GROUP BY TYPE;
```

(½ Mark for correct SELECT statement)
(½ Mark for correct GROUP BY clause)

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

Ans
```
SELECT MNAME, ISSUEDATE FROM MEMBER WHERE
ISSUEDATE>='2017-01-01' AND ISSUEDATE<='2017-12-31';
OR
SELECT MNAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE
BETWEEN '2017-01-01' AND '2017-12-31';
OR
SELECT MNAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE
LIKE '2017%';
```

(½ Mark for correct SELECT statement)
(½ Mark for correct WHERE clause)

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

Ans

MAX(ISSUEDATE)
2017-02-23

(½ Mark for correct output)

(vi) `SELECT DISTINCT TYPE FROM BOOK;`

Ans

```
DISTINCT TYPE
Fiction
Literature
Comic
```

(½ Mark for correct output)
NOTE: Values may be written in any order

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

Ans

```
CODE  BNAME                        MNO    MNAME
L102  The priest                    M101   RAGHAV SINHA
F102  Untold Story                  M103   SARTHAK JOHN
C101  Tarzan in the lost world      M102   ANISHA KHAN
```

(½ Mark for correct output)

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

Ans

```
BNAME
German Easy
```

OR

```
BNAME
The priest
German easy
Tarzan in the lost world
Untold Story
War heroes
```

(½ Mark for writing any one of the above two outputs)

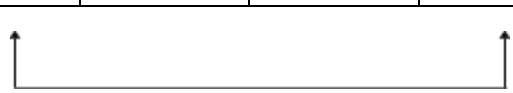
6 (a) State Distributive Laws of Boolean Algebra and verify them using truth table. 2

Ans

(i) X. (Y+Z)= X.Y + X.Z
(ii) X + Y.Z= (X + Y). (X+Z)

Truth Table Verification:
(i)

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	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	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1



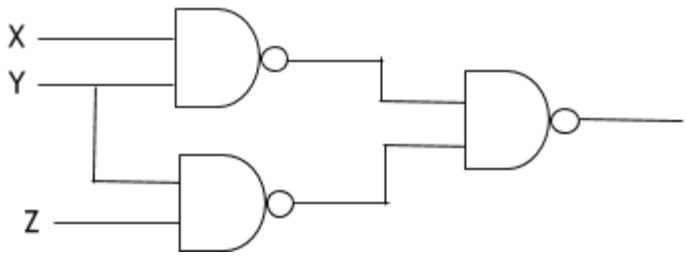
(ii)

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

(1 Mark for stating any one Distributive Law correctly)
(1 Mark for correctly verifying any one Distributive Law using Truth Table)

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

Ans

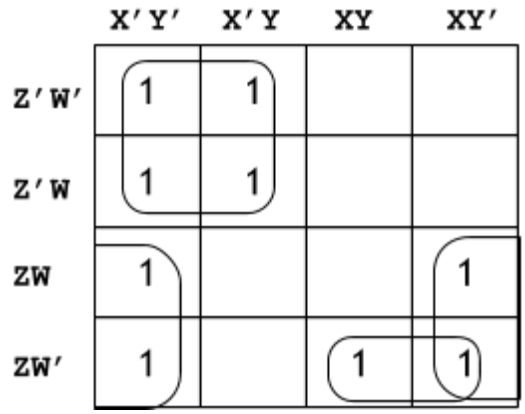
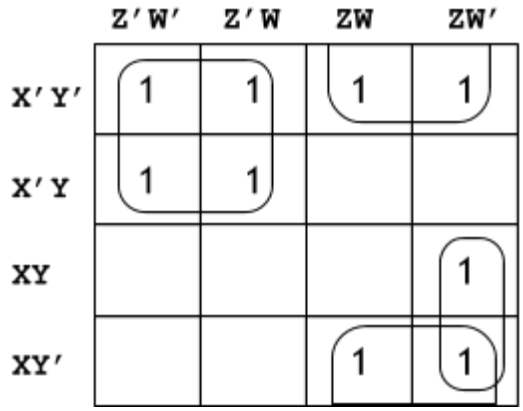


(Full 2 Marks for drawing the Logic Circuit for the expression correctly)
OR
(½ Mark for drawing Logic circuit for (X NAND Y) correctly)
(½ Mark for drawing Logic circuit for (Y NAND Z) correctly)

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

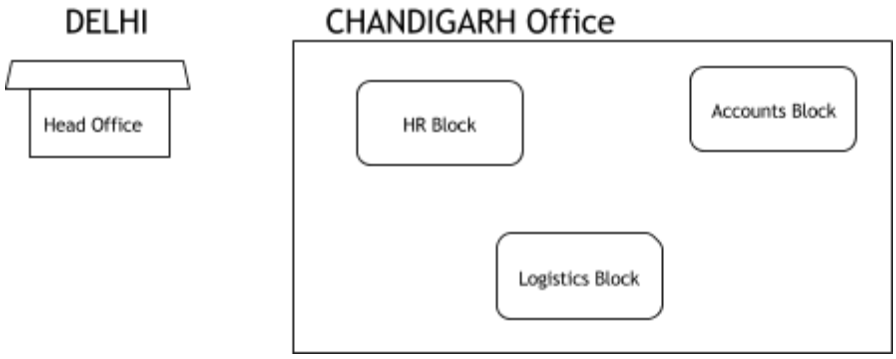
U	V	W	F(U,V,W)
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

Ans **F(U,V,W)= U'V'W' + U'VW' + U'VW + UVW'**

		OR **F(U,V,W)=∑(0,2,3,6)**	
		(1 Mark for correctly writing the SOP form) ***OR*** ***(½ Mark for any two correct terms)*** ***Note: Deduct ½ mark if wrong variable names are written in the expression***	
	(d)	Reduce the following Boolean Expression to its simplest form using K-Map: **F(X,Y,Z,W)= Σ(0,1,2,3,4,5,10,11,14)**	3
	Ans	 **OR**  **F(X,Y,Z,W)= X'Z' + Y'Z + XZW'**	
		(½ Mark for drawing K-Map with correct variable names) ***(½ Mark for correctly plotting 1s in the given cells)*** ***(½ Mark each for 3 groupings)*** ***(½ Mark for writing final expression in reduced/minimal form)*** ***Note:*** • ***Deduct ½ mark if wrong variable names are used*** • ***Deduct ½ mark for any redundant group appearing in final expression***	
7	(a)	Differentiate between Radio Link and Microwave in context of wireless communication technologies.	2
	Ans	**Radio Link:** Data is transmitted outward from the antenna through free space in all directions. It is a Slow means of communication;	

		Microwave: Data is transmitted based on **line of sight** principle, faster than radio communication.	
		(Full 2 marks for any correct difference between Radio Link and Microwave) ***OR*** ***(1 Mark for writing correct features of any one wireless medium out of Radio Link or Microwave)***	
	(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: (i) Computer Worm (ii) Computer Virus (iii) Computer Bacteria (iv) Trojan Horse	2
	Ans	**(ii) Computer Virus** **OR** **(iv) Trojan Horse** ● **Pen drive containing Computer Virus / Trojan Horse was used before the abnormal functioning started, which might have corrupted the system files.** ● **Computer Virus/ Trojan Horse affects the system files and start abnormal functioning in the computer**	
		(1 Mark for writing any of the options (ii) OR (iv)) ***(1 Mark for writing any one correct justification)***	
	(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. Justify the reason for your chosen option: (i) Hacker (ii) Cracker (iii) Operator (iv) Network Admin	2
	Ans	**(i) Hacker** **A Hacker is a person who breaks into the network of an organization without any malicious intent.**	
		(1 Mark for writing correct option) ***(1 Mark for writing correct justification)***	
	(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.

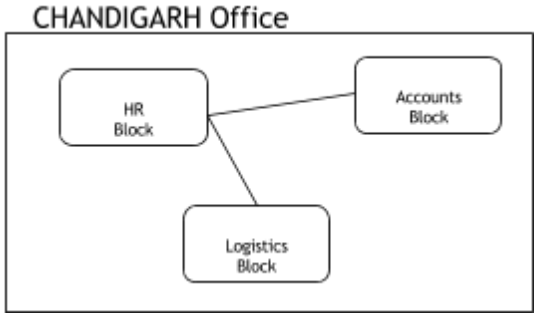


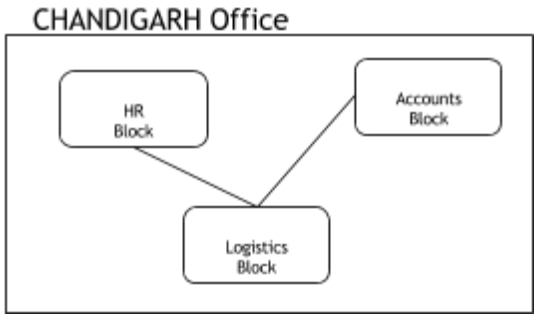
Shortest distances between various blocks/locations:

HR Block to Accounts Block	400 Metres
Accounts Block to Logistics Block	200 Metres
Logistics Block to HR Block	150Metres
DELHI Head Office to CHANDIGARH Office	270 Km

Number of Computers installed at various blocks are as follows:

HR Block	70
Account Block	50
Logistics Block	40

	(i)	Suggest the most appropriate block/location to house the SERVER in the CHANDIGARH Office (out of the 3 Blocks) to get the best and effective connectivity. Justify your answer.	1
	Ans	**HR Block - Because it has maximum number of computers.**	
		(½ Mark for correct Block/location) ***(½ Mark for valid justification)***	
	(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
	Ans	**Best wired medium: Optical Fibre OR CAT5 OR CAT6 OR CAT7 OR CAT8 OR Ethernet Cable** 	

		OR  	
		(½ Mark for writing best wired medium) ***(½ Mark for drawing the layout correctly)***	
	(iii)	Suggest a device/software and its placement that would provide data security for the entire network of CHANDIGARH office.	1
	Ans	**Firewall - Placed with the server at the HR Block** **OR** **Any other valid device/software name**	
		(½ Mark for writing device/software name correctly) ***(½ Mark for writing correct placement)***	
	(iv)	Which of the following kind of network, would it be (a) PAN (b) WAN (c) MAN (d) LAN	1
	Ans	**(b) WAN and (d) LAN** **OR** **(b) WAN** **OR** **(d) LAN**	
		(1 Mark for writing any one of the correct option(s))	