SET-4

Series GBM

Code No. 91

Roll No. | | | | | | | |

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

- Please check that this question paper contains **20** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **7** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

COMPUTER SCIENCE

Time allowed : 3 hours *Maximum Marks : 70*

General Instructions :

(i) *SECTION A refers to programming language C++.*

(ii) *SECTION B refers to programming language Python.*

(iii) *SECTION C is compulsory for all.*

(iv) *Answer either SECTION A or SECTION B.*

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

(vi) ***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) new

(ii) While

(iii) case

(iv) Num_2

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

(i) Function strlen should have prototype

(ii) Undefined symbol cout

(iii) Undefined symbol endl

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 : *1*

```
void main()
{
    char Txt[] = "Welcome";
    for(int C= 0; C<strlen(Txt); C++)
      Txt[C] = Txt[C]+1;
    cout<<Txt<<endl;
}
```

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

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

```
void main()
{
   cout<<"Enter an Alphabet:";
   cin>>CH;
   switch(CH)

      case 'A' cout<<"Ant";   Break;
      case 'B' cout<<"Bear" ; 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 Diff(N1,N2) ((N1>N2)?N1-N2:N2-N1)
void main()
{
    int A,B,NUM[] = {10,23,14,54,32};
    for(int CNT =4; CNT>0; CNT--)
    {
        A=NUM[CNT];
        B=NUM[CNT-1];
        cout<<Diff(A,B)<<'#';
    }
}
```

(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 *Point, Score[]={100,95,150,75,65,120};
    Point = Score;
    for(int L = 0; L<6; L++)
    {
        if((*Point)%10==0)
            *Point /= 2;
        else
            *Point -= 2;
        if((*Point)%5==0)
            *Point /= 5;
        Point++;
    }
    for(int L = 5; L>=0; L--)
      cout<<Score[L]<<"*";
}
```

(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 N and M. 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 N=random(3),M=random(4);
   int DOCK[3][3] = {{1,2,3},{2,3,4},{3,4,5}};

   for(int R=0; R<N; R++)
   {
      for(int C=0; C<M; C++)
         cout<<DOCK[R][C]<<" ";
      cout<<endl;
   }
}
```

(i)	(ii)
1 2 3 2 3 4 3 4 5	1 2 3 2 3 4
(iii)	**(iv)**
1 2 2 3	1 2 2 3 3 4

2. (a) Differentiate between protected and private 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 TEST
{
    long TCode;
    char TTitle[20];
    float Score;
public:
    TEST()                              //Member Function 1
    {
        TCode=100;strcpy(TTitle,"FIRST Test");Score=0;
    }
    TEST(TEST &T)                       //Member Function 2
    {
        TCode=E.TCode+1;
        strcpy(TTitle,T.TTitle);
        Score=T.Score;
    }
};

void main()
{
    ________________                    //Statement 1
    ________________                    //Statement 2
}
```

(i) Which Object Oriented Programming feature is illustrated by the Member Function 1 and the Member Function 2 together in the class TEST ? *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 BOX in C++ with the following description : *4*

Private Members

```
- BoxNumber   // data member of integer type
- Side        // data member of float type
- Area        // data member of float type
- ExecArea()  // Member function to calculate and assign
              // Area as Side * Side
```

Public Members

```
- GetBox()    // A function to allow user to enter values of
              // BoxNumber and Side. Also, this
              // function should call ExecArea() to calculate
              // Area

- ShowBox()  // A function to display BoxNumber, Side
              // and Area
```

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

```
class First
{
   int X1;
protected:
   float X2;
public:
   First();
   void Enter1(); void Display1();
};
```

```
class Second : private First
{
   int Y1;
protected:
   float Y2;
public:
   Second();
   void Enter2();
   void Display();
};

class Third : public Second
{
   int Z1;
public:
   Third();
   void Enter3();
   void Display();
};
void main()
{
   Third 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 Third as declared in main() function.

(iii) Write Statement 2 to call function Display() of class Second from the object T of class Third.

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

3. (a) Write the definition of a function AddUp(int Arr[], int N) in C++, in which all even positions (i.e., 0,2,4,...) of the array should be added with the content of the element in the next position and odd positions (i.e., 1,3,5,...) elements should be incremented by 10. *3*

Example : if the array Arr contains

23	30	45	10	15	25

Then the array should become

53	40	55	20	40	35

Note :

- The function should only alter the content in the same array.
- The function should not copy the altered content in another array.
- The function should not display the altered content of the array.
- Assuming, the Number of elements in the array are Even.

(b) Write a definition for a function SUMMIDCOL(int MATRIX[][10], int N,int M) in C++, which finds the sum of the middle column's elements of the MATRIX (Assuming N represents number of rows and M represents number of columns, which is an odd integer). *2*

Example : If the content of array MATRIX having N as 5 and M as 3 is as follows :

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

The function should calculate the sum and display the following :

Sum of Middle Column : 15

(c) ARR[15][20] is a two-dimensional array, which is stored in the memory along the row with each of its elements occupying 4 bytes. Find the address of the element ARR[5][15], if the element ARR[10][5] is stored at the memory location 35000. *3*

(d) Write the definition of a member function PUSHGIFT() for a class STACK in C++, to add a GIFT in a dynamically allocated stack of GIFTs considering the following code is already written as a part of the program : *4*

```
struct GIFT
{
    int GCODE;              //Gift Code
    char GDESC[20];         //Gift Description
    GIFT *Link;
};

class STACK
{
    Gift *TOP;
public:
    STACK(){TOP=NULL;}
    void PUSHGIFT();
    void POPGIFT();
    ~STACK();
};
```

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

X – (Y + Z) / U * V

4. (a) Polina Raj has used a text editing software to type some text in an article. After saving the article as **MYNOTES.TXT**, she realised that she has wrongly typed alphabet K in place of alphabet C everywhere in the article.

Write a function definition for **PURETEXT()** in C++ that would display the corrected version of the entire article of the file **MYNOTES.TXT** with all the alphabets "K" to be displayed as an alphabet "C" on screen. *3*

Note : Assuming that **MYNOTES.TXT** does not contain any C alphabet otherwise.

Example :

If Polina has stored the following content in the file **MYNOTES.TXT** :

```
I OWN A KUTE LITTLE KAR.
I KARE FOR IT AS MY KHILD.
```

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

```
I OWN A CUTE LITTLE CAR.
I CARE FOR IT AS MY CHILD.
```

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

```
class PHOTOS
{
   int PCODE;
   char PTYPE[20];//Photo Type as "PORTRAIT","NATURE"
public:
   void ENTER()
   {
      cin>>PCODE;gets(PTYPE);
   }

   void SHOWCASE()
   {
      cout<<PCODE<<":" <<PTYPE<<endl;
   }
   char *GETPTYPE(){return PTYPE;}
};
```

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

```
class CLIENTS
{
   int CCode;char CName[20];
public:
   void REGISTER(); void DISPLAY();
};

void main()
{
   fstream File;
   File.open("CLIENTS.DAT",ios::binary|ios::in);
   CLIENTS C;
   File.seekg(6*sizeof(C));
   File.read((char*)&C, sizeof(C));
   cout<<"Client Number:"<<File.tellg()/sizeof(C) + 1;
   File.seekg(0,ios::end);
   cout<<" of "<<File.tellg()/sizeof(C)<<endl;
   File.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) `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 the 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

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

(b) *2*

```
class Exam:
   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 the 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 the 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**.

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.

```
52, 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,+,/,-
```

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

(b) Write a method in Python 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
```

SECTION C

[For all the candidates]

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*

MEMBER

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

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*

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

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 the 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");
```

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,Z)
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*

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

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

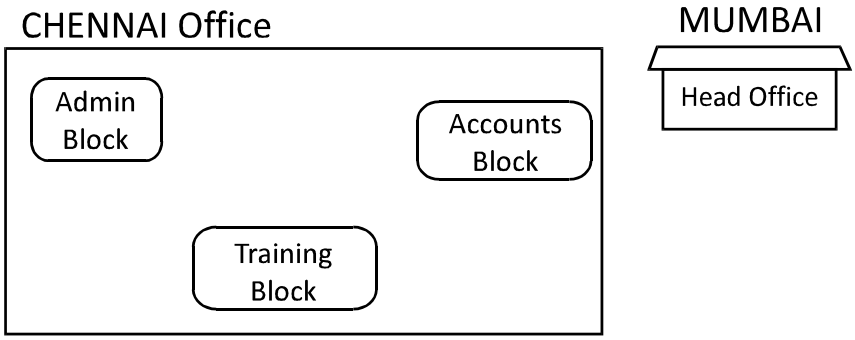
(ii) Cracker

(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 in 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 the 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*

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CBSE AISSCE 2016-2017 Marking Scheme for Computer Science

(Sub Code: 083 Paper Code 91 Outside 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) new (ii) While (iii) case (iv) Num_2	2
	Ans	**(i) new - Keyword** **(ii) While - User defined Identifier** **(iii) case - Keyword** **(iv) Num_2 - 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 three errors as follows: (i) Function strlen should have prototype (ii) Undefined symbol cout (iii) Undefined symbol endl 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()` `{`	1

	Ans	`string.h` `iostream.h OR fstream.h OR iomanip.h`	
		(½ Mark each for writing 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 Alphabet:";` `  cin>>CH;` `  switch(CH)` `  case 'A' cout<<"Ant";  Break;` `  case 'B' cout<<"Bear" ; Break;` `}`	2
	Ans	`void main()` `{` `  cout<<"Enter an Alphabet:";` `  char CH;  // Error 1` `  cin>>CH;` `  switch(CH)` `  {  // Error 2(i)` `  case 'A' :  // Error 3(i)` `  cout<<"Ant"; break;  // Error 4(i)` `  case 'B' :  // Error 3(ii)` `  cout<<"Bear"; 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 Diff(N1,N2) ((N1>N2)?N1-N2:N2-N1)`	2

```
        A=NUM[CNT];
        B=NUM[CNT-1];
        cout<<Diff(A,B)<<'#';
    }
}
```

Ans 22#40#9#13#

(½ Mark for writing each correct value)
OR
(1 Mark to be awarded if the output written in reverse order as 13#9#40#22#)
Note: Deduct ½ Mark for not considering any/all # as separator and/or writing the values in different lines

(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 *Point, Score[]={100,95,150,75,65,120};
   Point = Score;
   for(int L = 0; L<6; L++)
   {
      if((*Point)%10==0)
         *Point /= 2;
      else
         *Point -= 2;
      if((*Point)%5==0)
         *Point /= 5;
      Point++;
   }
   for(int L = 5; L>=0; L--)
     cout<<Score[L]<<"*";
}
```

Ans `12*63*73*15*93*10*`

(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*
- *Deduct ½ Mark if the output written in reverse order as 10*93*15*73*63*12**
- *Full 3 Marks to be awarded if "Multiple declaration/syntax error for L" is mentioned*

- 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 N=random(3),M=random(4);
  int DOCK[3][3] = {{1,2,3},{2,3,4},{3,4,5}};
  for(int R=0; R<N; R++)
  {
     for(int C=0; C<M; C++)
        cout<<DOCK[R][C]<<"  ";
     cout<<endl;
  }
}
```

(i)	(ii)
1 2 3 2 3 4 3 4 5	1 2 3 2 3 4
(iii)	**(iv)**
1 2 2 3	1 2 2 3 3 4

Ans

Correct Options : (ii) and (iii)

Maximum value of N = 2
Maximum value M = 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 N)
(½ Mark for writing correct Maximum value of M)

2. (a) Differentiate between protected and private 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	protected
Implicit Visibility Mode Not accessible to member functions of	Explicit Visibility Mode Accessible to member functions of

```
protected:
     int Y;
public:
     void Z();
};
```

OR

Any other correct example demonstrating difference between private and protected members of a class

(Full 2 Marks for any one correct difference between private and protected members in a class using a suitable code in C++)

OR

(1 Mark for writing any one correct difference between private and protected members in a class without any example)

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

Note: Assume all necessary files are included.

```
class TEST
{
  long TCode;
  char TTitle[20];
  float Score;
public:
  TEST()                          //Member Function 1
  {
     TCode=100;strcpy(TTitle,"FIRST Test");Score=0;
  }
  TEST(TEST &T)                   //Member Function 2
  {
     TCode=E.TCode+1;
     strcpy(TTitle,T.TTitle);
     Score=T.Score;
  }
};
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 TEST? 1

Ans **Polymorphism OR Constructor overloading OR Function Overloading**

		`TEST T2(T1);` //Statement 2 **OR** `TEST T2=T1;` //Statement 2	
		(½ Mark for writing statement 1 correctly) ***(½ Mark for writing statement 2 correctly OR ½ Mark for mentioning E not declared)***	
	(c)	Write the definition of a class BOX in C++ with following description: Private Members `- BoxNumber // data member of integer type` `- Side // data member of float type` `- Area // data member of float type` `- ExecArea() // Member function to calculate and assign // Area as Side * Side` Public Members `- GetBox() // A function to allow user to enter values of // BoxNumber and Side. Also, this // function should call ExecArea() to calculate // Area` `- ShowBox()// A function to display BoxNumber, Side // and Area`	4
	Ans	`class BOX` `{` `  int BoxNumber ;` `  float Side ;` `  float Area ;` `  void ExecArea(){ Area=Side*Side;}` `public:` `  void GetBox();` `  void ShowBox();` `};` `void BOX::GetBox()` `{` `  cin>>BoxNumber>>Side;` `  ExecArea();` `}` `void BOX::ShowBox()` `{` `  cout<<BoxNumber<<" "<<Side<<" "<<Area<<endl;` `}`	
		(½ Mark for declaring class header correctly) ***(½ Mark for declaring data members correctly)*** ***(1 Mark for defining ExecArea() correctly)*** ***(½ Mark for taking inputs of BoxNumber and Side in GetBox())***	

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

```
class First
{
  int  X1;
protected:
  float X2;
public:
  First();
  void Enter1(); void Display1();
};
class Second : private First
{
  int Y1;
protected:
  float Y2;
public:
  Second();
  void Enter2();
  void Display();
};
class Third : public Second
{
  int Z1;
public:
  Third();
  void Enter3();
  void Display();
};
void main()
{
   Third 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

```
Enter2()
Second::Display()
Enter3()
Display() OR Third::Display()
```

(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 Display() of class Second from the object T of class Third.

Ans

```
T.Second::Display();
```

(1 Mark for writing Statement 2 correctly)

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

Ans First, Second, Third

(1 Mark for writing correct order)
- ***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 AddUp(int Arr[], int N) in C++, in which all even positions (i.e. 0,2,4,...) of the array should be added with the content of the element in the next position and odd positions (i.e. 1,3,5,...) elements should be incremented by 10. 3

Example: if the array Arr contains

23	30	45	10	15	25

Then the array should become

53	40	55	20	40	35

NOTE:
- The function should only alter the content in the same array.
- The function should not copy the altered content in another array.
- The function should not display the altered content of the array.
- Assuming, the Number of elements in the array are Even.

Ans

```
void AddUp(int Arr[], int N)
{
   for(int i=0; i<N; i++)
   {
      if(i%2==0)
         Arr[i]=Arr[i]+Arr[i+1];
```

		Any other correct C++ code for the required function definition.	
		(1 Mark for correctly writing the loop) ***(1 Mark for correctly checking condition for even/odd locations)*** ***(½ Mark for adding the element in the next position to the even positioned elements)*** ***(½ Mark for incrementing the element by 10 for odd positioned elements)***	
	(b)	Write a definition for a function SUMMIDCOL(int MATRIX[][10],int N,int M) in C++, which finds the sum of the middle column's elements of the MATRIX (Assuming N represents number of rows and M represents number of columns, which is an odd integer). Example: if the content of array MATRIX having N as 5 and M as 3 is as follows: 1 **2** 1 2 **1** 4 3 **4** 5 4 **5** 3 5 **3** 2 The function should calculate the sum and display the following: Sum of Middle Column: 15	2
	Ans	`void SUMMIDCOL(int MATRIX[][10],int N,int M)` `{` `  int mid=M/2;` `  int sum=0;` `  for(int i=0; i<N; i++)` `  {` `  sum=sum+MATRIX[i][mid];` `  }` `  cout<<" Sum of Middle Column"<<sum;` `}` **OR** **Any other correct C++ code for the required function definition**	
		(½ Mark for correctly writing the loop) ***(1 Mark for adding middle column elements)*** ***(½ Mark for displaying the sum of middle column elements)***	
	(c)	ARR[15][20] is a two-dimensional array, which is stored in the memory along the row with each of its elements occupying 4 bytes. Find the address of the element ARR[5][15], if the element ARR[10][5] is stored at the memory location 35000.	3
	Ans	`ROW MAJOR:` `Loc(ARR[I][J]) =BaseAddress + W [( I – LBR)*C + (J – LBC)]`	

```
LOC(ARR[10][5])
35000          = BaseAddress + W(I*C + J)
35000          = BaseAddress + 4(10*20 + 5)
35000          = BaseAddress + 4(205)
35000          = BaseAddress + 820
BaseAddress    = 35000 - 820
               = 34180

LOC(ARR[5][15])= BaseAddress + W(I*C + J)
               = 34180       + 4(5*20 + 15)
               = 34180       + 4(100 + 15)
               = 34180       + 4 x 115
               = 34180       + 460
               = 34640
OR
Loc(ARR[I][J]) = Ref. Address + W (( I - LR)*C + (J - LC))
(where
W=size of each element = 4 bytes,
R=Number of Rows =15, C=Number of Columns=20
Reference Address= Address of given cell ARR[10][5]=35000
LR = Row value of given cell = 10
LC = Column value of given cell = 5

LOC(ARR[5][15]) = LOC(ARR[10][5]) + 4((5-10)*20 + (15-5))
LOC(ARR[5][15]) = 35000 + 4(-100 + 10)
                = 35000 + 4[-90]
                = 35000 -360
                = 34640
```

(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 PUSHGIFT() for a class STACK in C++, to add a GIFT in a dynamically allocated stack of GIFTs considering the following code is already written as a part of the program: 4

```
struct GIFT
{
   int GCODE;          //Gift Code
   char GDESC[20];     //Gift Description
   GIFT *Link;
};

class STACK
{
  Gift *TOP;
public:
  STACK(){TOP=NULL;}
```

ANS

```
void STACK::PUSHGIFT()
{
  GIFT *T = new GIFT;
  cin>>T->GCODE;
  gets(T->GDESC);
  T->Link = TOP;
  TOP = T;
}
```

(1 Mark for creating a new Node)
(1 Mark for fetching values of GCODE and GDESC)
(1 Mark for assigning TOP to the Link of the new Node)
(1 Mark for assigning TOP to the new Node)

NOTE:
GIFT/Gift - Both acceptable

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

X - (Y + Z) / U * V

Ans

ELEMENT	Stack	POSTFIX
X		X
-	-	X
(	-(	X
Y	-(	XY
+	-(+	XY
Z	-(+	XYZ
)	-	XYZ+
/	-/	XYZ+
U	-/	XYZ+U
*	-*	XYZ+U/
V	-*	XYZ+U/V
		XYZ+U/V*-

OR

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

ELEMENT	Stack	POSTFIX
(		
X		X
-	-	
(		
(		
(		
Y		XY

)	-	XYZ+U/
*	-*	
V		XYZ+U/V
)		XYZ+U/V*
)		XYZ+U/V*-

Postfix= XYZ+U/V*-

OR

Any other method for converting the given **infix** expression to its equivalent **postfix** expression showing stack contents.

(½ Mark for correctly converting till each operator)
OR
(1 Mark to be given for writing correct answer without showing the stack content on each step)

4. (a) **Polina Raj has used a text editing software to type some text in an article. After saving the article as MYNOTES.TXT, she realised that she has wrongly typed alphabet K in place of alphabet C everywhere in the article.**

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

```
I OWN A KUTE LITTLE KAR.
I KARE FOR IT AS MY KHILD.
```

The function PURETEXT() should display the following content:

```
I OWN A CUTE LITTLE CAR.
I CARE FOR IT AS MY CHILD.
```

3

Ans

```
void PURETEXT()
{
 char ch;
 ifstream F("MYNOTES.TXT" );
 while(F.get(ch))
 {
   if(ch=='K')
    ch='C';
   cout<<ch;
 }
 F.close(); //IGNORE
}
```

OR

```
OR
fstream F;
F.open("MYNOTES.TXT", ios::in);
OR
fstream F("MYNOTES.TXT", ios::in);
```

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

```
class PHOTOS
{
  int PCODE;
  char PTYPE[20];//Photo Type as "PORTRAIT","NATURE"
public:
  void ENTER()
  {
     cin>>PCODE;gets(PTYPE);
  }
  void SHOWCASE()
  {
    cout<<PCODE<<":"<<PTYPE<<endl;
  }
  char *GETPTYPE(){return PTYPE;}
};
```

Ans

```
void COUNTPICS()
{
  ifstream F;
  F.open("PHOTOS.DAT",
                    ios::binary);
  int count=0;
  PHOTOS obj;
  while(F.read((char*)&obj,
                     sizeof(obj)))

  {
    if(strcmp(obj.GETPTYPE(),"PORTRAIT")==0)
        count++;
  }
  cout<<"Number of PORTRAIT photos :"<<count;
  F.close(); //IGNORE
}
```

OR

```
fstream F;
F.open("PHOTOS.DAT",
            ios::binary|ios::in);
```

OR

Any other correct function definition

(½ Mark for opening PHOTOS.DAT correctly)
(½ Mark for reading records from PHOTOS.DAT)
(½ Mark for comparing PHOTOS of type PORTRAIT(ignore case sensitive checking) with strcmp or strcmpi)
(½ Mark for displaying counter for matching records)

(c) Find the output of the following C++ code considering that the binary file 1

```
  void REGISTER();void DISPLAY();
};

void main()
{
  fstream File;
  File.open("CLIENTS.DAT",ios::binary|ios::in);
  CLIENTS C;
  File.seekg(6*sizeof(C));
  File.read((char*)&C, sizeof(C));
  cout<<"Client Number:"<<File.tellg()/sizeof(C) + 1;
  File.seekg(0,ios::end);
  cout<<" of "<<File.tellg()/sizeof(C)<<endl;
  File.close();
}
```

Ans `Client Number 8 of 200`

(½ Mark for displaying correct value of File.tellg()/sizeof(C) + 1)
(½ Mark for displaying correct value of File.tellg()/sizeof(C))

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) `4thSum`
(ii) `Total`
(iii) `Number#`
(iv) `_Data`

Ans ii) Total iv) _Data

(1 mark for each correct option)
NOTE:
Deduct ½ Mark for each wrong name written

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

(i) `floor()`
(ii) `randint()`

Ans
`math`
`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. 2

```
STRING=""WELCOME
```

	Ans	STRING="WELCOME" NOTE="" for S in range(0,8): print STRING[S] print S,STRING Also range(0,8) will give a runtime error as the index is out of range. It should be range(0,7) *(½ Mark for each for any four corrections)* ***OR*** ***(1 mark for identifying the errors, without suggesting corrections)***	
	(d)	Find and write the output of the following python code: 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	2
	Ans	47.0 35.0 54.0 26.0 *(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 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")	3

		`I2.Status()`	
	Ans	**Output** `101 : Pad # 125` `102 : U Clip # 150` `105 : Thumb Pin # 35` *(1 mark for each correct line of output)* *NOTE:* *•Deduct ½ Mark for not writing any or all ':' / '#' 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. `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`	2
	Ans	`(i) BACKRIGHT` `Max value 3 and minimum value 1 for variable NUM` OR I or N not defined OR ; wrongly placed in line 2 *(1 mark for mentioning the first option)* *NOTE: No marks to be awarded for writing any other option or any other combination* *(½ mark each for max and min values of NUM)* *OR* *(Full 2 Marks for mentioning the specific error(s))*	
2	(a)	List four characteristics of Object Oriented programming.	2
	Ans	• Encapsulation • Data Hiding • Abstraction	

```
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.

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 Regno and Marks.

(ii) Function 1 `E1=Exam(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 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
```

Ans

```
class BOX: # can also be given as  class BOX( ):
           # or class BOX(Object):
  def __init__(self):
    self.BoxID=101
    self.Side=10
    self.Area=0
  def ExecArea(self):
```

```
def __init__(self,B,S,A):
#Any variable instead of B, S, A may be used
        self.BoxID=B
        self.Side=S
        self.Area=A
```

		`print self.BoxID` `print self.Side` `print self.Area` ***(½ Mark for correct syntax for class header)*** ***(½ Mark for correct declaration of instance attributes)*** ***(1 Mark for correct definition of ExecArea( ) method)*** ***(1 Mark for correct definition of NewBox( ) with proper invocation of ExecArea( ))*** ***(1 Mark for correct definition of ViewBox( ))*** ***NOTE:*** ***Deduct ½ Mark if ExecArea( ) is not invoked properly inside NewBox( ) method***	
	(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 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**.	2
	Ans	`def Area(R):` `  print 3.14*R*R` `def Area(B,H):` `  print 0.5*B*H` ***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 overide 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 **ascending**	3

52	**42**	-10	60	90	20
42	**52**	**-10**	60	90	20
42	-10	**52**	**60**	90	20
42	-10	52	**60**	**90**	20
42	-10	52	60	**90**	**20**
42	-10	52	60	**20**	**90**

II Pass

42	**-10**	52	60	20	90
-10	**42**	**52**	60	20	90
-10	42	**52**	**60**	20	90
-10	42	52	**60**	**20**	90
-10	42	52	20	60	90

III Pass

-10	**42**	52	20	60	90
-10	**42**	**52**	20	60	90
-10	42	**52**	**20**	60	90
-10	42	20	52	60	90

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

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

Ans

```
def EvenSum(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(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

Ans

```
class queue:
  Member=[]
  def Addnew(self):
    a=input("enter member name: ")
```

```
        del queue.Member[0] # queue.Member.delete()
```

(½ mark for Addnew header)
(½ mark for accepting a value from user)
(½ mark for adding value in list)
(½ mark for Remove header)
(½ mark for checking empty list condition)
(½ mark for displaying removed Member)
(½ mark for displaying the value to be deleted)
(½ mark for deleting value from list)

NOTE:
Marks not to be deducted for methods written without using a class

(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
```

Ans

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

(½ mark method header)
(½ mark for loop)
(½ mark for checking condition of first letter M)
(½ mark for displaying value)

(e) Evaluate the following Postfix notation of expression: 2
`4,2,*,22,5,6,+,/,-`

Ans

Element	Stack Contents
4	4
2	4, 2
*	8
22	8,22
5	8, 22, 5
6	8, 22, 5, 6
+	8, 22, 11
/	8, 2
-	6

4	(a)	Differentiate between file modes **r+** and **rb+** 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.** **rb+ Opens a file for both reading and writing in binary format. The file pointer placed at the beginning of the file.** ***(1 mark for correct difference)*** ***OR*** ***(½ Mark for each correct use of r+ and rb+)***	
	(b)	Write a method in python to read lines from a text file MYNOTES.TXT, and display those lines, which are starting with an alphabet 'K'.	2
	Ans	`def display():` `  file=open('MYNOTES.TXT','r')` `  line=file.readline()` `  while line:` `  if line[0]=='K' :` `  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 K)*** ***(½ Mark for displaying line)***	
	(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'.** `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`	3
	Ans	`import pickle` `def ques4c( ):` `  f=Factory( )` `  file=open('FACTORY.DAT','rb')` `  try:` `  while True:` `  f=pickle.load(file)` `  if f.FCTID==105:`	

(½ Mark for correct loop)
(½ Mark for correct load( ))
(½ Mark for correct checking of FCTID)
(½ Mark for displaying the record)

SECTION C - (For all the candidates)

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

MEMBER

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

RESULT

NO	MNAME	STREAM
M002	ADITYA	HUMANITIES

Ans **(i) SELECTION**

Degree=3
Cardinality=1

(1 Mark for writing the correct name of RDBMS operation)
(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

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

MEMBER

MID	NAME	DCODE	ISSUEDATE
101	AGAM SINGH	R102	2017-11-30

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	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 DCODE and DTITLE of all Folk Type DVDs from the table DVD
	Ans	`SELECT DCODE,DTITLE FROM DVD WHERE DTYPE='Folk';`
		(½ Mark for correct SELECT statement) *(½ Mark for correct WHERE clause)*
	(iii)	To display the DTYPE and number of DVDs in each DTYPE from the table DVD
	Ans	`SELECT COUNT(*),DTYPE FROM DVD GROUP BY DTYPE;`
		(½ Mark for correct SELECT statement) *(½ Mark for correct GROUP BY clause)*
	(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
	Ans	`SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE>='2017-01-01' AND ISSUEDATE<='2017-12-31';` **OR** `SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE BETWEEN '2017-01-01' AND '2017-12-31';` **OR** `SELECT NAME, ISSUEDATE FROM MEMBER WHERE ISSUEDATE LIKE '2017%';`
		(½ Mark for correct SELECT statement) *(½ Mark for correct WHERE clause)*
	(v)	`SELECT MIN(ISSUEDATE) FROM MEMBER;`
	Ans	`MIN(ISSUEDATE)` 2016-12-13
		(½ Mark for correct output)
	(vi)	`SELECT DISTINCT DTYPE FROM DVD;`
	Ans	`DISTINCT DTYPE` Folk Classical Rock
		(½ Mark for correct output) *NOTE: Values may be written in any order*
	(vii)	`SELECT D.DCODE,NAME,DTITLE` `FROM DVD D, MEMBER M WHERE D.DCODE=M.DCODE ;`
	Ans	DCODE NAME DTITLE

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

Ans

DTITLE
A day in life

(½ Mark for correct output)

NOTE:
No marks to be awarded for any other output

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

Ans

(i) (A.B)'=A'+B'
(ii) (A+B)'=A'.B'

Truth Table Verification:

(i)

A	B	A.B	(A.B)'	A'	B'	A'+B'
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

(ii)

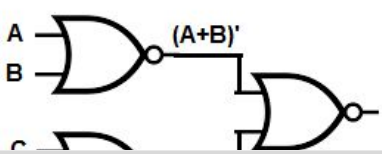
A	B	A+B	(A+B)'	A'	B'	A'.B'
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

(1 Mark for stating any one De Morgan's Theorems correctly)
(1 Mark for correctly verifying any one De Morgan's Theorems using Truth Table)

b. Draw the Logic Circuit of the following Boolean Expression using only NOR Gates: 2

(A+B) . (C+D)

Ans



(½ Mark for drawing Logic circuit for (A NOR B) correctly)
(½ Mark for drawing Logic circuit for (C NOR D) correctly)

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

X	Y	Z	G(X,Y,Z)
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

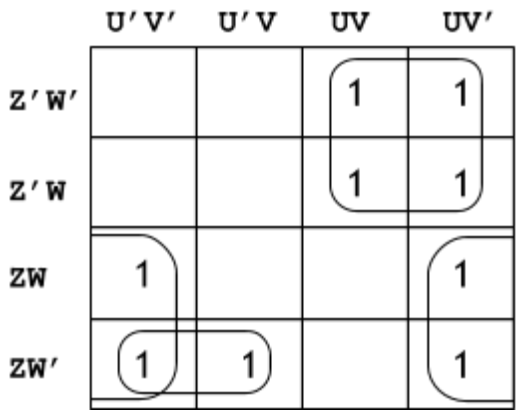
Ans

$G(X,Y,Z) = (X+Y+Z).(X+Y+Z').(X+Y'+Z').(X'+Y'+Z)$
OR
$G(X,Y,Z) = \prod(0,1,3,6)$

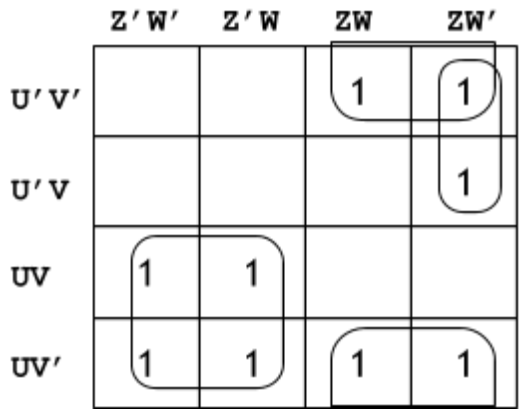
(1 Mark for correctly writing the POS form)
OR
(½ Mark for any two correct terms)
Note: Deduct ½ mark if wrong variable names are written in the expression

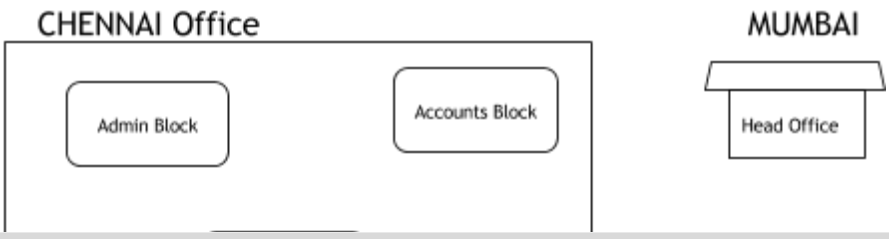
d. Reduce the following Boolean expression to its simplest form using K-Map: 3
$E(U,V,Z,W) = \Sigma(2,3,6,8,9,10,11,12,13)$

Ans



OR

		 **E(U,V,Z,W)=UZ'+V'Z+U'ZW'**	
		(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 communication using Optical Fiber and Ethernet Cable in context of wired medium of communication technologies.	2
	Ans	**Optical Fibre** • Very Fast • Expensive • Immune to electromagnetic interference **Ethernet Cable -** • Slower as compared to Optical Fiber • Less Expensive as compared to Optical Fiber • prone to electromagnetic interference	
		Full 2 marks for any one correct difference between Optical Fibre and Ethernet Cable ***OR*** ***1 Mark for writing correct features of any one wired medium out of Optical Fibre or Ethernet Cable***	
	(b)	Janish Khanna 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 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: (i) Computer Virus	2

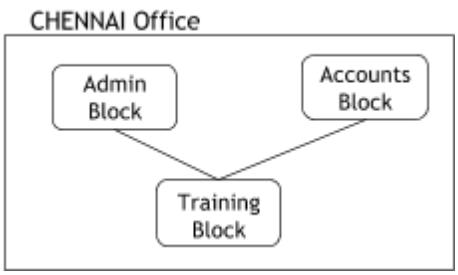
		(iv) Trojan Horse **Justification:** • **Pen drive containing Computer Virus / Trojan Horse was used before the abnormal functioning started, which might have corrupted the system files.** • **Computer Virus/ Trojan Horse affects the system files and start abnormal functioning in the computer**	
		(1 Mark for writing any of the options (i) OR (iv)) ***(1 Mark for writing any one correct justification)***	
	(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? 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 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 Account 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 in the CHENNAI Office (out of the 3 blocks) to get the best and effective connectivity. Justify your answer.	1
	Ans	**Training 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 CHENNAI office compound.	1
	Ans	**Best wired medium: Optical Fibre OR CAT5 OR CAT6 OR CAT7 OR CAT8 OR Ethernet Cable** 	
		(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 the CHENNAI office.*	1
	Ans	**Firewall - Placed with the server at the Training Block** **OR** **Any other valid device/software name**	
		(½ Mark for writing device/software name correctly) ***(½ Mark for writing correct placement)***	
	(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	**Device Name: WiFi Router OR WiMax OR RF Router OR Wireless Modem OR RF**	