CBSE AISSCE 2015-2016 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++/Python Language 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)**	Out of the following, find those identifiers, which can not be used for naming Variable, Constants or Functions in a C++ program:
		`Total*Tax, double, Case, My Name,`
		`NeW, switch, Column31, _Amount`
			2

	Ans	**`Total*Tax`**
		`double`
		`My Name`
		`switch`
		(½ Mark for each correct name)
		Note:
		Deduct ½ Mark for each wrong name written	

	(b)	Ronica Jose has started learning C++ and has typed the following program. When she compiled the following code written by her, she discovered that she needs to include some header files to successfully compile and execute it. Write the names of those header files, which are required to be included in the code.
		`void main()`
		`{`
		`  double X,Times,Result;`
		`  cin>>X>>Times;`
		`  Result=pow(X,Times);`
		`  cout<<Result<<endl;`
		`}`
			1

Ans

- **iostream.h OR iomanip.h**
- **math.h**

(½ Mark for writing each correct header file)
Note:

- ***Ignore any other header files, if mentioned.***
- `complex.h` ***is acceptable in place of math.h***

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

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

```
#define Formula(a,b) = 2*a+b
void main()
{
  float X=3.2;Y=4.1;
  Z=Formula(X,Y);
  cout<<’Result=’<<Z<<endl;
}
```

Ans

```
#define Formula(a,b) 2*a+b
void main()
{
 float X=3.2 , Y=4.1;
 float Z=Formula(X,Y);
 cout<<”Result=”<<Z<<endl;
}
```

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

(d) Find and write the output of the following C++ program code: **2**
Note: Assume all required header files are already included in the program.

```
typedef char TEXT[80];
void JumbleUp(TEXT T)
{
  int L=strlen(T);
  for (int C=0;C<L-1;C+=2)
  {
    char CT=T[C];
    T[C]=T[C+1];
    T[C+1]=CT;
  }
  for (C=1;C<L;C+=2)
    if (T[C]>=’M’ && T[C]<=’U’)
      T[C]=’@’;
}
void main()
{
  TEXT Str=”HARMONIOUS”;
  JumbleUp(Str);
  cout<<Str<<endl;
}
```

Ans

```
AHM@N@OIS@
```

(2 Marks for correct output)
OR
(½ Mark for each of two correct consecutive characters not exceeding 1½ marks)

(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.

```
class Share
{
  long int Code;
  float Rate;
  int DD;
public:
  Share(){Code=1000;Rate=100;DD=1;}
  void GetCode(long int C,float R)
  {
    Code=C;
    Rate=R;
  }
  void Update(int Change,int D)
  {
    Rate+=Change;
    DD=D;
  }
  void Status()
  {
    cout<<”Date:”<<DD<<endl;
    cout<<Code<<”#”<<Rate<<endl;
  }
};
```

```
void main()
{
  Share S,T,U;
  S.GetCode(1324,350);
  T.GetCode(1435,250);
  S.Update(50,28);
  U.Update(-25,26);
  S.Status();
  T.Status();
  U.Status();
}
```

Ans

```
Date:28
1324#400
Date:1
1435#250
Date:26
1000#75
```

(½ Mark for each correct line of output)

Note:

- **Deduct only ½ *Mark for not writing any or all 'Date' OR ':' OR '#' symbol(s)***
- **Deduct ½ *Mark for not considering any or all endl(s) at proper place(s)***

(f) Look at the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable PICKER. **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 PICKER;
  PICKER=1+random(3);
  char COLOR[][5]={"BLUE","PINK","GREEN","RED"};
  for(int I=0;I<=PICKER; I++)
  {
    for(int J=0; J<=I;J++)
      cout<<COLOR[J];
    cout<<endl;
  }
}
```

(i)	(ii)	(iii)	(iv)
PINK PINKGREEN PINKGREENRED	BLUE BLUEPINK BLUEPINKGREEN BLUEPINKGREENRED	GREEN GREENRED	BLUE BLUEPINK BLUEPINKGREEN

Ans

(ii)	(iv)
BLUE BLUEPINK BLUEPINKGREEN BLUEPINKGREENRED	BLUE BLUEPINK BLUEPINKGREEN

Minimum Value of PICKER = 1
Maximum Value of PICKER = 3

(1 Mark for mentioning both the correct options)
Note: No Mark to be awarded for writing any one additional option with (ii) and (iv).
OR
(½ Mark for only (iv))

(½ Mark each for Minimum and Maximum Value of PICKER)

2 **(a)** Write any four important characteristics of Object Oriented Programming? Give example of any one of the characteristics using C++. **2**

Ans

- **Encapsulation**
- **Data Hiding**
- **Polymorphism**
- **Inheritance**

Example of Encapsulation

```
class student
{
   int rno;
   char name[20];
public:
   void input()
    {
       cin>>rno;
       gets(name);
    }
```

```
      void output()
      {
         cout<<rno<<”  “<<name<<endl;
      }
};
```

The data members and member functions are wrapped up together(encapsulated) into a single unit called class.

OR

Any other suitable example demonstrating a characteristic of Object Oriented Programming.

(1 Mark for correct names of 4 characteristics of OOP)
OR
(½ Mark for correct names of any 2 characteristics of OOP)

(1 Mark for correct example of 1 characteristic)

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

```
class BOOK
{
   long Code ;
   char Title[20];
   float Price;
public:
   BOOK()                        //Member Function 1
   {
     cout<<”Bought”<<endl;
     Code=10;strcpy(Title,”NoTitle”);Price=100;
   }
   BOOK(int C,char T[],float P)  //Member Function 2
   {
     Code=C;
     strcpy(Title,T);
     Price=P;
   }
   void Update(float P)          //Member Function 3
   {
     Price+=P;
   }
   void Display()                  //Member Function 4
   {
     cout<<Code<<”:”<<Title<<”:”<<Price<<endl;
   }

   ~BOOK()                         //Member Function 5
   {
     cout<<”Book Discarded!”<<end1;
   }
};
void main()                        //Line 1
{                                  //Line 2
  BOOK B,C(101,”Truth”,350};      //Line 3
  for (int I=0;I<4;I++)           //Line 4
  {                                //Line 5
    B.Update(50);C.Update(20);    //Line 6
    B.Display();C.Display();      //Line 7
  }                                //Line 8
}                                  //Line 9
```

	(i)	Which specific concept of object oriented programming out of the following is illustrated by Member Function 1 and Member Function 2 combined together? ● Data Encapsulation ● Polymorphism ● Inheritance ● Data Hiding	1
	Ans	**Polymorphism** ***(1Mark for mentioning the correct concept name)***	
	(ii)	How many times the message `”Book Discarded!”` **will be displayed after executing the above C++ code? Out of Line 1 to Line 9, which line is responsible to display the message** `”Book Discarded!”`	1
	Ans	**2 times** **Line 9** ***(½ Mark for writing correct number of times)*** ***OR*** ***(½ Mark for writing - “No execution due to wrong syntax in Line 3”*** ***OR any other equivalent answer conveying similar meaning)*** ***(½ Mark for writing correct line number)***	

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

Private Members

```
- Ccode    //Data member for City Code (an integer)
- CName    //Data member for City Name (a string)
- Pop      //Data member for Population (a long int)
- KM       //Data member for Area Coverage (a float)
- Density  //Data member for Population Density (a float)
- DenCal() //A member function to calculate ---
           //Density as Pop/KM
```

```
Public Members
- Record() //A function to allow user to enter values of
            //Acode,Name,Pop,KM and call DenCal() function
- View()   //A function  to display all the data members
           //also display a message "Highly Populated City"
           //if the Density is more than 10000
```

Ans

```
class CITY
{
  int Ccode;
  char CName[20];
  long int Pop;
  float KM;
  float Density;
  void DenCal();
public:
  void Record();
  void View();
};
void CITY::Record()
{
  cin>>Ccode;
  gets(CName);  //OR cin>>CName;
  cin>>Pop;
  cin>>KM;
  DenCal();
}
void CITY::View()
{
  cout<<Ccode<<CName<<Pop<<KM<<Density; //Ignore endl
  if(Density>10000)
    cout<<"Highly Populated City";      //Ignore endl
}
void CITY::DenCal()
{
  Density= Pop/KM;
}
```

(½ Mark for correct syntax for class header)
(½ Mark for correctly ending the class declaration with ;)
(½ Mark for correct declaration of data members)
(½ Mark for correct definition of DenCal() function)
(1 Mark for correct definition of Record() with proper invocation of DenCal() function)
(1 Mark for correct definition of View())
NOTE:

- ***Deduct ½ Mark if DenCal() is not invoked properly inside Record() function***
- **Marks not to be deducted if any or all the member functions are defined inside the class**

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

```
class ITEM
{
  int  Id;
  char IName[20];
protected:
  float Qty;
public:
  ITEM();
  void Enter(); void View();
};
class TRADER
{
  int DCode;
protected:
  char Manager[20];
public:
  TRADER();
  void Enter();
  void View();
};
```

```
class SALEPOINT : public ITEM,private TRADER
{
  char Name[20],Location[20];
public :
  SALEPOINT();
  void EnterAll();
  void ViewAll();
};
```

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

- Single Level Inheritance
- Multi Level Inheritance
- Multiple Inheritance

Ans **Multiple Inheritance**

(1 Mark for writing correct option)

(ii) Write the names of all the data members, which are directly accessible from the member functions of class SALEPOINT.

Ans **`Name, Location, Manager, Qty`**

(1 Mark for correct answer)

Note:
No marks to be awarded for any partial answer

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

Ans **`EnterAll(), ViewAll(), Enter(), View()`**

(1 Mark for correct answer)

Note: No marks to be awarded for any partial answer

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

Ans **(i) ITEM()**
(ii) TRADER()
(iii) SALEPOINT()

(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 FixSalary(float Salary[], int N) in C++, which should modify each element of the array Salary having N elements, as per the following rules: **2**

Existing Salary Values	Required Modification in Value
If less than 100000	Add 35% in the existing value
If >=100000 and <20000	Add 30% in the existing value
If >=200000	Add 20% in the existing value

Ans

```
void FixSalary(float Salary[ ], int N)
{
 for (int i=0;i<N;i++)
     if(Salary[i]<100000)
       Salary[i]+= 0.35 *Salary[i];
    else if (Salary[i]>=100000 && Salary[i]<20000)
       Salary[i]+= 0.3 * Salary[i];
     else if(Salary[i]>=200000)
       Salary[i]+= 0.20 * Salary[i];
}
```

OR

Any other correct equivalent function definition

(½ Mark for correctly writing the loop)
(½ Mark for correctly checking all conditions)
(1 Mark for correct increment of Salary for all conditions)
OR
(½ Mark for checking only one of the conditions correctly)
(½ Mark for incrementing only one of the Salary correctly)

Note:

- ***Marks not to be deducted for writing second condition check for the range as*** `>=100000 && <200000` ***instead of*** `>=100000 && <20000`
- **Marks not to be deducted for incrementing Salary as** `Salary[i]+=Salary[i]*20/100;` **OR** `Salary[i]+=20/100*Salary[i];` **and likewise for all increments**

(b) R[10][50] is a two dimensional array, which is stored in the memory along the row with each of its element occupying 8 bytes, find the address of the element R[5][15], if the element R[8][10] is stored at the memory location 45000. **3**

Ans

```
Loc(R[I][J])
     =BaseAddress + W [( I – LBR)*C  + (J – LBC)]
(where
W=size of each element = 8 bytes,
R=Number of Rows=10, C=Number of Columns=50)
Assuming LBR = LBC = 0
LOC(R[8][10])
    45000 = BaseAddress + W[ I*C  + J]
    45000 = BaseAddress + 8[8*50 + 10]
    45000 = BaseAddress + 8[400 + 10]
    45000 = BaseAddress + 8 x 410
    BaseAddress = 45000 - 3280
                = 41720

LOC(R[5][15])= BaseAddress + W[ I*C  + J]
             = 41720 + 8[5*50 + 15]
             = 41720 + 8[250 + 15]
             = 41720 + 8 x 265
             = 41720 + 2120
             = 43840
```

OR

```
Loc(R[I][J])
     =Reference Address + W [( I – LR)*C  + (J – LC)]
(where
W=size of each element = 8 bytes,
R=Number of Rows=10, C=Number of Columns=50)
Reference Address= Address of given cell R[8][10]=45000
LR = Row value of given cell = 8
LC = Column value of given cell = 10
LOC(R[5][15])= LOC(T[8][10]) + 8[(5 - 8)*50 + (15 - 10)]
LOC(R[15][5]) = 45000 + 8[-3*50 + 5]
              = 45000 + 8[-150 + 5]
              = 45000 + 8 x (-145)
              = 45000 - 1160
         = 43840
```

(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)

(c) Write the definition of a member function DELETE() for a class QUEUE in C++, to remove a product from a dynamically allocated Queue of products considering the following code is already written as a part of the program. **4**

```
struct PRODUCT
{
  int PID; char PNAME[20];
  PRODUCT *Next;
};
class QUEUE
{
  PRODUCT *R,*F;
public:
  QUEUE(){R=NULL;F=NULL;}
  void INSERT();
  void DELETE();
 ~QUEUE();
};
```

Ans

```
void QUEUE::DELETE()
{
  if( F!=NULL)
  {
    PRODUCT *T = F;
    cout<<T->PID<<T->PNAME;
    F=F->Next;
    delete T;
    if(F==NULL)
    {
      R=NULL;
    }
  }
  else
     cout<<"Queue Empty";
}
```

(½ Mark for checking empty queue)

(½ Mark for assigning front to temporary pointer)

(1 Mark for reassigning front)

(1 Mark for deleting previous front using temporary pointer)

(½ Mark for checking emptied queue after deletion)

(½ Mark for assigning rear to NULL if queue was emptied after deletion)

(d) Write definition for a function DISPMID(int A[][5],int R,int C) in C++ to display the elements of middle row and middle column from a two dimensional array A having R number of rows and C number of columns. **3**

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

215	912	516	401	515
103	901	921	802	601
285	209	609	360	172

The function should display the following as output

```
103 901 921 802 601
516 921 609
```

ANS

```
void DISPMID(int A[][5],int R,int C)
{
  for (int J=0;J<C;J++)
     cout<<A[R/2][J]<< “ “;
  cout<<endl;
  for (int I=0;I<R;I++)
     cout<<A[I][C/2]<< “ “;
}
```

OR

```
void DISPMID(int A[][5],int R,int C)
{
  if(R%2!=0)
  {
    for (int J=0;J<C;J++)
      cout<<A[R/2][J]<< “ “;
  }
  else
    cout<<”No Middle Row”;
  cout<<endl;
  if(C%2!=0)
  {
    for (int I=0;I<R;I++)
     cout<<A[I][C/2]<< “ “;
  }
  else
    cout<<"No Middle Column";
}
```

OR

Any other correct equivalent function definition

(½ Mark for correct loop for displaying middle row elements)
(1 Mark for correct statement to display middle row elements)
(½ Mark for correct loop for displaying middle column elements)
(1 Mark for correct statement to display middle column elements)

(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 = (P / (Q-R) * S + T)`

Element	Stack of Operators	Postfix Expression
(	(	
P	(	P
/	(/	P
(	(/(	P
Q	(/(	PQ
-	(/(-	PQ
R	(/(-	PQR
)	(/	PQR-
*	(*	PQR-/
S	(*	PQR-/S
+	(+	PQR-/S*
T	(+	PQR-/S*T
)		PQR-/S*T+

= PQR-/S*T+

OR

`P/(Q-R)*S+T = (((P / (Q-R)) * S) + T)`

Element	Stack of Operators	Postfix Expression
(		
(		

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

= PQR-/S*T+

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)** Write function definition for DISP3CHAR() in C++ to read the content of a text file KIDINME.TXT, and display all those words, which have three characters in it. **2**

Example:

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

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

The function DISP3CHAR() should display the following:

```
was the mom and all the
```

Ans

```
void DISP3CHAR()
{
   ifstream Fil;
   Fil.open(“KIDINME.TXT”);
   char W[20];
   Fil>>W;
   while(!Fil.eof())  // OR while(Fil)
   {
     if (strlen(W)) == 3)
       cout<<W<< “ “;
     Fil>>W;
   }
   Fil.close();     //Ignore
}
```

OR

Any other correct function definition

(½ Mark for opening KIDINME.TXT correctly)
(½ Mark for reading each word (using any method) from the file)
(½ Mark for checking length of the extracted word to be of 3 letters)
(½ Mark for displaying the 3 letter extracted word correctly)

Note:
No marks to be deducted if words with length 4 and including a ‘.’ is also checked

(b) Write a definition for function ONOFFER( ) in C++ to read each object of a binary file TOYS.DAT, find and display details of those toys, which has status as “ÖN OFFER”. Assume that the file TOYS.DAT is created with the help of objects of class TOYS, which is defined below: **3**

```
class TOYS
{
  int TID;char Toy[20],Status[20]; float MRP;
public:
  void Getinstock()
  {
    cin>>TID;gets(Toy);gets(Status);cin>>MRP;
  }
  void View()
  {
    cout<<TID<<”:”<<Toy<<”:”<<MRP<<””:”<<Status<<endl;
  }
  char *SeeOffer(){return Status;}.
};
```

Ans

```
void ONOFFER()
{
  TOYS T;
  ifstream fin;
  fin.open(“TOYS.DAT”, ios::binary);
   while(fin.read((char*)&T, sizeof(T)))
   {
     if(strcmp(T.SeeOffer(),”ON OFFER”)==0)
       T.View();
   }
   fin.close(); //Ignore
}
```

OR

Any other correct function definition

(1Mark for opening TOYS .DAT correctly)
(½ Mark for reading records from TOYS.DAT)
(½ Mark for comparing Remarks with ON OFFER (ignore case sensitive checking))
(1 Mark for displaying record)

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

```
class CLIENT
{
  int Ccode;char CName[20];
public:
  void Register();void Display();
};
```

```
void main()
{
  fstream CFile;
  CFile.open(“CLIENT.DAT”,ios::binary|ios::in);
  CLIENT C;
  CFile.read((char*)&C, sizeof(C));
  cout<<”Rec:”<<CFile.tellg()/sizeof(C)<<endl;
  CFile.read((char*)&C, sizeof(C));
  CFile.read((char*)&C, sizeof(C));
  cout<<”Rec:”<<CFile.tellg()/sizeof(C)<<endl;
  CFile.close();
}
```

	Ans	`Rec:1`
		`Rec:3`
		
		(½ Mark for each correct value of CFile.tellg()/sizeof(C) as 1 and 3 respectively)	

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

1	**(a)**	Out of the following, find those identifiers, which can not be used for naming Variable or Functions in a Python program:
		
		`Total*Tax, While, class, switch,`
		`3rdRow, finally, Column31, _Total`
			2

	Ans	`Total*Tax, class, 3rdRow, finally`	
		(½ Mark for each correct name) ***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 (i) `sqrt()` (ii) `dump()`	1
	Ans	(i) math (ii) pickle	
		(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.
		`for Name in [Ramesh,Suraj,Priya]`
		`    IF Name[0]='S':`
		`       print(Name)`
			2

	Ans	`for Name in [“Ramesh”, “Suraj”, “Priya”] : // ‘ ‘ can be used`
		`      if Name[0] == ‘S’:`
		`             print(Name)`	

		(½ Mark for each correction) ***OR*** ***(1 mark for identifying the errors, without suggesting corrections)***	
	(d)	Find and write the output of the following python code:	2

```
Values=[10,20,30,40]
for Val in Values:
    for I in range(1, Val%9):
        print(I,"*",end="")
    print()
```

Ans

1* 1* 2* 1* 2* 3*	() (1, *) () (1 ,*) (2 ,*) () (1, *) (2, *) (3, *) ()	() (1 *) (1 * 2 *) (1 * 2 * 3 *)
		1* 1*2* 1*2*3*

(2 marks for correct output)
OR
(½ mark for each correct value with '' not exceeding 2 Marks)*
OR
(2 mark for mentioning the syntax error in line `print(I,"*",end="")` *)*

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

```
class Book:
   def __init__(self,N=100,S="Python"): #constructor
      self.Bno=N
      self.BName=S
   def Assign(self, N,S):
      self.Bno= self.Bno + N
      self.BName= S + self.BName
   def ShowVal(self):
      print(self.Bno,"#",self.BName)
s=Book()
t=Book(200)
u=Book(300,"Made Easy")
s.ShowVal()
t.ShowVal()
u.ShowVal()
s.Assign(5, "Made ")
```

```
t.Assign(15,"Easy ")
u.Assign(25,"Made Easy")
s.ShowVal()
t.ShowVal()
u.ShowVal()
```

Ans

Python 2.7 output	Other Versions output
100 # Python 200 # Python 300 # Made Easy 105 # Made Python 215 # Easy Python 325 # Made EasyMade Easy	(100, '#', 'Python') (200, '#', 'Python') (300, '#', 'Made Easy') (105, '#', 'Made Python') (215, '#', 'Easy Python') (325, '#', 'Made EasyMade Easy')

(½ 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 PICKER. 2

```
import random
PICKER=random.randint(0,3)
COLOR=["BLUE","PINK","GREEN","RED"];
for I in COLOR:
  for J in range(1,PICKER):
    print(I,end="")
  print()
```

(i)	(ii)	(iii)	(iv)
BLUE PINK GREEN RED	BLUE BLUEPINK BLUEPINKGREEN BLUEPINKGREENRED	PINK PINKGREEN GREENRED	BLUEBLUE PINKPINK GREENGREEN REDRED

Ans Option (i) and (iv) are possible

OR

Option (i) only

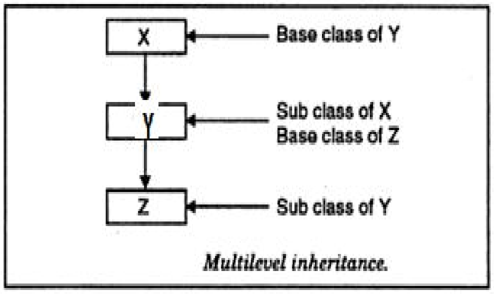
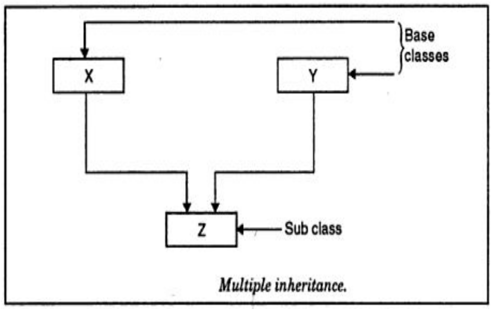
PICKER maxval=3 minval=0

(1 Mark for mentioning correct option(s))
Note: No marks to be awarded for writing any other option.

(½ Mark each for Minimum and Maximum Value of PICKER)

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

Ans

Multilevel inheritance	Multiple inheritance
 X Base class of Y Y Sub class of X Base class of Z Z Sub class of Y *Multilevel inheritance.*	 *Multiple inheritance.*
X is the parent class of Y and Y is the parent class of Z	The child class Z has parents X and Y

(1 mark for correct difference)
(1 mark for correct example)

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

```
AMAR
THREE
A123
1200
```

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

```
Start=0
while True:
  try:
    Number=int(raw_input("Enter Number"))
    break
  except ValueError:
    Start=Start+2
    print(“Re-enter an integer”)
print(Start)
```

Ans

Output:

```
Enter Number AMAR
Re-enter an integer
Enter Number THREE
Re-enter an integer
Enter Number A123
Re-enter an integer
Enter Number 1200
6
```

Explanation: The code inside try makes sure that the valid number is entered by the user. When any input other than an integer is entered, a value error is thrown and it prompts the user to enter another value.

(½ mark for correct output for text entry)
(½ mark for correct output for number entry)
(1 mark for correct explanation of try and except)

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

Instance Attributes

```
- Ccode   # Numeric value
- CName   # String value
- Pop     # Numeric value for Population
- KM      # Numeric value
- Density # Numeric value for Population Density
```

Methods:

```
- DenCal() # Method to calculate Density as Pop/KM
- Record() # Method to allow user to enter values
             Ccode,CName,Pop,KM and call DenCal() method
- View()   # Method to display all the members
             also display a message ”Highly Populated City”
             if the Density is more than 10000.
```

Ans

```
class CITY:
   def __init__(self):
     self.Ccode = 0
     self.CName = “”
     self.Pop = 0
     self.KM =0
     self.Density=0
  def DenCal(self):
     self.Density = self.Pop / self.KM
  def Record(self):
     self.Ccode = input(“Enter CCode”)
     self.CName = raw_input(“Enter CName”)
     self.Pop = input(“Enter population”)
     self.KM = input(“Enter KM”)
     DenCal(self)                 // or self.DenCal()
  def View(self):
     print CCode,CName,Pop, KM, Density
     if self.Density > 10000:
        print(“Highly populated city”)
        # OR print(“Highly populated city”)
```

(½ Mark for correct syntax for class header)
(1 Mark for correct declaration of instance attributes)
(½ Mark for correct definition of DenCal() function)
(1 Mark for correct definition of Record() with proper invocation of DenCal() function)
(1 Mark for correct definition of View())

NOTE:
Deduct ½ Mark if DenCal() is not invoked properly inside Record() function

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

Ans

Abstract method: An unimplemented method is called an abstract method. When an abstract method is declared in a base class, the derived class has to either define the method or raise “NotImplementedError”

OR

Abstract Method can be used to enable parent class method execution.

```
class Shape(object):
    def findArea(self):
        pass
class Square(Shape):
  def __init__(self,side):
      self.side = side
def findArea(self):
    return  self.side * self.side
```

(1 mark for correct explanation)
(1 mark for any correct example)

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

Ans super() function is used to call base class methods which has been extended in derived class.
EX:

```
class GradStudent(Student):
   def __init__(self):
      super(GradStudent, self).__init__()
      self.subject = ""
      self.working = ""
   def readGrad (self):
      # Call readStudent method of parent class
      super(GradStudent, self).readStudent()
```

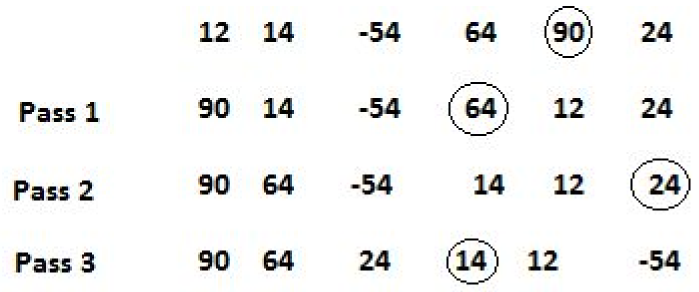
(1 mark for correct explanation)
(1 mark for correct example)

3. (a) What will be the status of the following list after the First, Second and Third pass of the selection 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.

`12, 14, -54, 64, 90, 24`

Ans



	12	14	-54	64	90	24
Pass 1	90	14	-54	64	12	24
Pass 2	90	64	-54	14	12	24
Pass 3	90	64	24	14	12	-54

(1 mark for each correct pass)

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

Ans

```
def binarysrch(nums,x):
   high = len(nums)
   low =0
   while low < high:
     mid = (low + high)//2
     midval = nums[mid]
     if midval > x:
       low = mid + 1
     elif midval < x:
       high = mid
     else:
       return mid
   return -1
```

(½ mark for assignment of high/ub and low/lb)
(½ mark for appropriate looping condition)
(½ mark for calculation of Mid)
(½ mark for changing high/ub and low/lb)

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

Ans

```
class queue:
   city = [ ]
   def Insert(self):
     a = raw_input(“Enter city”)
     queue.city.append(a)
   def Delete(self):
     if (queue.city == [ ] ):
       print “Queue empty”
     else:
       print “Deleted element is”, queue.city[0]
       queue.city.delete()
```

OR

```
class queue:
   city = [ ]
   def Insert(self):
     a = raw_input(“Enter city”)
     queue.a.append(a)
   def Delete(self):
     if (queue.city == [ ] ):
       print(“Queue empty”)
     else:
       print("Deleted element is", queue.city[0])
       queue.city.delete()
```

(½ mark insert header)
(½ mark for accepting a value from user)
(½ mark for adding value in list)
(½ mark for delete header)
(½ mark for checking empty list condition)
(½ mark for displaying "Empty Message")
(½ mark for displaying the value to be deleted)
(½ mark for deleting value from list)

(d) Write a method in python to find and display the prime numbers between 2 to N. Pass N as argument to the method. 3

Ans

```
def prime(N):
  for a in range(2,N):
    Prime=1
    for I in range(2,a):
      if a%i ==0:
         Prime=0
    if Prime==1:
      print a
```

OR

```
def prime(N):
  for a in range(2,N):
    for I in range(2,a):
      if a%i ==0:
        break
    else:
      print a
```

OR

Any other correct code performing the same

(½ mark function header)
(½ mark for outer loop)
(½ mark for inner loop)
(1 mark for divisibility check)
(½ mark for displaying prime number)

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

`12,2,/,34,20,-,+,5,+`

Ans

Element	Stack
12	12
2	12, 2
/	6
34	6, 34
20	6, 34, 20
-	6, 14
+	20
5	20, 5
+	25

Final Result = 25

(½ Mark for evaluation till each operator)
OR
(1 Mark for only writing the Final answer without showing stack status)

4 **(a)** Write a statement in Python to perform the following operations: 1

- To open a text file “MYPET.TXT” in write mode
- To open a text file “MYPET.TXT” in read mode

Ans

```
●  f1 = open(“MYPET.TXT”,’w’)

   f2 = open(“MYPET.TXT”, ‘r’)
```

(½ Mark for each correct statement)

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

Ans

```
def  writel():
  f = open(“daynote.txt”,’w’)
  while True:
    line = raw_input(“Enter line”)
    f.write(line)
    choice = raw_input(“Are there more lines”)
    if choice == ‘N’:
      break
  f.close()
```

Note: Using writelines() is also correct

(½ Mark for opening file in appropriate mode)
(½ Mark for end of file check and loop)
(½ Mark for taking input from user)
(½ Mark for writing the line into the file)

(c) Consider the following definition of class Employee, write a method in python to search and display the content in a pickled file emp.dat, where Empno is matching with ‘A0005’. **3**

```
class Employee:
    def __init__(self,E,NM):
        self.Empno=E
        self.EName=NM

    def Display(self):
        print(self.Empno," - ",self.EName)
```

Ans

```
def search():
    f = open("emp.dat", ‘rb’)
    try:
       while True:
          e = pickle.load(f)
          if e.Empno == ‘A0005’:
             e.display()
    except EOFError:
       pass
    f.close()
```

(½ Mark for correct function header)
(½ Mark for opening the file emp.dat correctly)
(½ Mark for correct file check and loop)
(½ Mark for correct load())
(½ Mark for correct checking of Empno)
(½ Mark for displaying the record)

SECTION C - (For all the candidates)

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

PARTICIPANTS

PNO	NAME
1	Aruanabha Tariban
2	John Fedricks
3	Kanti Desai

EVENTS

EVENTCODE	EVENTNAME
1001	IT Quiz
1002	Group Debate

RESULT

PNO	NAME	EVENTCODE	EVENTNAME
1	Aruanabha Tariban	1001	IT Quiz
1	Aruanabha Tariban	1002	Group Debate
2	John Fedricks	1001	IT Quiz
2	John Fedricks	1002	Group Debate
3	Kanti Desai	1001	IT Quiz
3	Kanti Desai	1002	Group Debate

Ans **Cartesian Product**

Degree = 4
Cardinality = 6

(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**

Table: VEHICLE

VCODE	VEHICLETYPE	PERKM
V01	VOLVO BUS	150
V02	AC DELUXE BUS	125
V03	ORDINARY BUS	80
V05	SUV	30
V04	CAR	18

Note: PERKM is Freight Charges per kilometer

Table: TRAVEL

CNO	CNAME	TRAVELDATE	KM	VCODE	NOP
101	K.Niwal	2015-12-13	200	V01	32
103	Fredrick Sym	2016-03-21	120	V03	45
105	Hitesh Jain	2016-04-23	450	V02	42
102	Ravi Anish	2016-01-13	80	V02	40
107	John Malina	2015-02-10	65	V04	2
104	Sahanubhuti	2016-01-28	90	V05	4
106	Ramesh Jaya	2016-04-06	100	V01	25

Note:

- Km is Kilometers travelled
- NOP is number of passengers travelled in vehicle

(i) To display CNO, CNAME, TRAVELDATE from the table TRAVEL in descending order of CNO.

Ans

```
SELECT CNO, CNAME, TRAVELDATE FROM TRAVEL ORDER BY CNO
DESC;
```

(½ Mark for `SELECT CNO, CNAME, TRAVELDATE FROM TRAVEL`*)*
(½ Mark for `ORDER BY CNO DESC`*)*

(ii) To display the CNAME of all the customers from the table TRAVEL who are traveling by vehicle with code V01 or V02.

Ans

```
SELECT CNAME FROM TRAVEL WHERE VCODE=‘V01’ OR
VCODE=’V02’;
```

OR

```
SELECT CNAME FROM TRAVEL WHERE VCODE IN (‘V01’, ‘V02’);
```

(½ Mark for correct `SELECT`*)*
(½ Mark for correct `WHERE clause`*)*

(iii) To display the CNO and CNAME of those customers from the table TRAVEL who travelled between ‘2015-12-31’ and ‘2015-05-01’.

Ans

```
SELECT CNO, CNAME from TRAVEL WHERE TRAVELDATE >=
‘2015-05-01’ AND TRAVELDATE <= ‘2015-12-31’;
```

OR

```
SELECT CNO, CNAME from TRAVEL
WHERE TRAVELDATE BETWEEN ‘2015-05-01’ AND ‘2015-12-31’;
```

OR

```
SELECT CNO, CNAME from TRAVEL
WHERE TRAVELDATE <= ‘2015-12-31’
                  AND TRAVELDATE >= ‘2015-05-01’;
```

OR

```
SELECT CNO, CNAME from TRAVEL
WHERE TRAVELDATE BETWEEN ‘2015-12-31’ AND ‘2015-05-01’;
```

(½ Mark for correct `SELECT`*)*
(½ Mark for correct `WHERE clause` *)*

(iv) To display all the details from table TRAVEL for the customers, who have travel distance more than 120 KM in ascending order of NOP.

Ans

```
SELECT * FROM TRAVEL
WHERE KM > 120 ORDER BY NOP;
```

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

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

	Ans	<u>COUNT(*)</u> <u>VCODE</u> 2 V01 2 V02 *(½ Mark for correct output)*	
	(vi)	`SELECT DISTINCT VCODE FROM TRAVEL;`	
	Ans	<u>DISTINCT VCODE</u> V01 V02 V03 V04 V05 *(½ Mark for correct output)*	

	(vii)	`SELECT A.VCODE,CNAME,VEHICLETYPE`
		`FROM TRAVEL A,VEHICLE B`
		`WHERE A.VCODE=B.VCODE AND KM<90;`	

	Ans	<u>VCODE</u> <u>CNAME</u> <u>VEHICLETYPE</u> V02 Ravi Anish AC DELUXE BUS V04 John Malina CAR *(½ Mark for correct output)*	

	(viii)	`SELECT CNAME,KM*PERKM`
		`FROM TRAVEL A,VEHICLE B`
		`WHERE A.VCODE=B.VCODE AND A.VCODE='V05';`	

	Ans	<u>CNAME</u> <u>KM*PERKM</u> Sahanubhuti 2700 *(½ Mark for correct output)*	
6	a.	Verify the following using Boolean Laws. X'+ Y'Z = X'.Y'.Z'+ X'.Y.Z'+ X'Y.Z+ X'.Y'.Z+ X.Y'.Z	2
	Ans	LHS X' + Y'.Z = X'.(Y + Y').(Z + Z') + (X + X').Y'.Z	

```
= X′.Y.Z + X′.Y.Z′ + X′.Y′.Z + X′.Y′.Z′ + X.Y′.Z + X′.Y′.Z
= X′.Y.Z + X′.Y.Z′ + X′.Y′.Z + X′.Y′.Z′ + X.Y′.Z
= X′.Y′.Z′ + X′.Y.Z′ + X′.Y.Z + X′.Y′.Z + X.Y′.Z
```

= RHS

OR

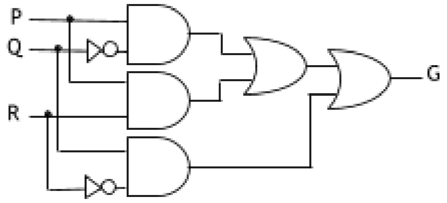
RHS

```
X′.Y′.Z′ + X′.Y.Z′ + X′.Y.Z + X′.Y′.Z + X.Y′.Z
= X′.Y′.Z + X′.Y′.Z′ + X′.Y.Z + X′.Y.Z′ + X.Y′.Z
= X′.Y′.(Z+Z′) + X′.Y.(Z+Z′) + X.Y′.Z
= X′.Y′ + X′.Y + X.Y′.Z
= X′.(Y′+Y) +X.Y′.Z
= X′ + X.Y′.Z
= (X′ + X).(X′ + Y′.Z)
= X′ + Y′.Z
```

= LHS

(2 Marks for correct Verification)
OR
(1 Mark for expanding LHS up to 1 correct step)
OR
(1 Mark for reducing RHS up to 1 correct step)

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



Ans `P.Q′ + P.R + Q.R′`

(2 Marks for correctly writing the full expression)
OR
(½ Mark each for correctly writing any one term)

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

A	B	C	G(A,B,C)
0	0	0	1
0	0	1	0

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

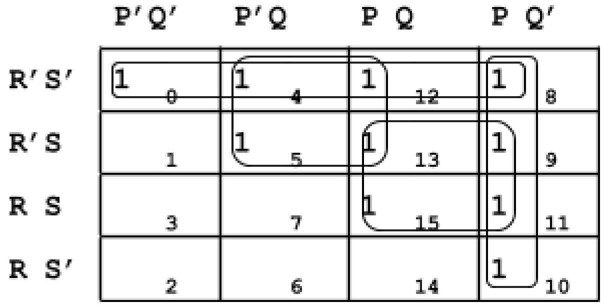
Ans G(A,B,C) = A′.B′.C′ + A′.B.C′ + A.B.C′ + A.B.C
OR
G(A,B,C) = Σ(0,2,6,7)

(1 Mark for correctly writing the SOP form)

Note: Deduct ½ mark if wrong variable names are written in the expression

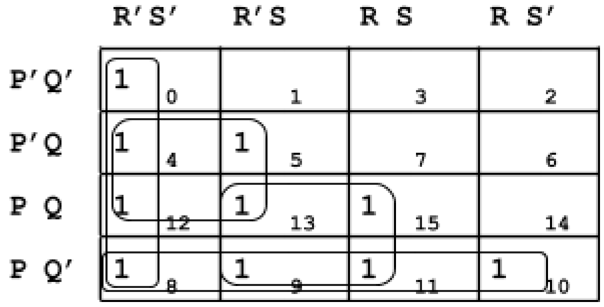
(d) Reduce the following Boolean Expression to its simplest form using K-Map: **3**

F(P,Q,R,S)= Σ(0,4,5,8,9,10,11,12,13,15)



	P′Q′	P′Q	P Q	P Q′
R′S′	1 0	1 4	1 12	1 8
R′S	1	1 5	1 13	1 9
R S	3	7	1 15	1 11
R S′	2	6	14	1 10

OR



	R′S′	R′S	R S	R S′
P′Q′	1 0	1	3	2
P′Q	1 4	1 5	7	6
P Q	1 12	1 13	1 15	14
P Q′	1 8	1 9	1 11	1 10

F(P,Q,R,S) = R′S′+ PQ′ + QR′+ PS

<table>
<tr><td></td><td></td><td><b><i>(½ Mark for drawing K-Map with correct variable names)</i></b>
<b><i>(½ Mark each for 4 groupings)</i></b>
<b><i>(½ Mark for writing final expression in reduced/minimal form)</i></b>

<b><i>Note: Deduct ½ mark if wrong variable names are used</i></b></td><td></td></tr>
<tr><td><b>7</b></td><td><b>(a)</b></td><td>Differentiate between PAN and LAN types of networks.</td><td><b>1</b></td></tr>
<tr><td></td><td><b>Ans</b></td><td>
<table>
<tr><th><b>PAN -</b> Personal Area Network</th><th><b>LAN -</b> Local Area Network</th></tr>
<tr><td>A personal area network - PAN - is a computer network organized around an individual person.</td><td>LAN interconnects a high number of access or node points or stations within a confined physical area upto a kilometer.</td></tr>
</table>
</td><td></td></tr>
<tr><td></td><td></td><td><b><i>(1 mark for one correct point of difference)</i></b>
<b><i>OR</i></b>
<b><i>(1 mark for</i> Any other correct difference for PAN and LAN)</b></td><td></td></tr>
<tr><td></td><td><b>(b)</b></td><td>Which protocol helps us to transfer files to and from a remote computer?</td><td><b>1</b></td></tr>
<tr><td></td><td><b>Ans</b></td><td><b>FTP OR Telnet OR TCP</b>

<b><i>(1 Mark for any one correct protocol name)</i></b></td><td></td></tr>
<tr><td></td><td><b>(c)</b></td><td>Write two advantages of 3G over 2G Mobile Telecommunication Technologies in terms of speed and services?</td><td><b>1</b></td></tr>
<tr><td></td><td><b>Ans</b></td><td>Speed -
● Faster web browsing
● Faster file transfer
Service -
● Better video clarity
● Better security
<b>OR</b>
<b>(Any other correct advantage can be considered)</b></td><td></td></tr>
<tr><td></td><td></td><td><b><i>(½ Mark for each of any one point for Speed/Service)</i></b></td><td></td></tr>
<tr><td></td><td><b>(d)</b></td><td>Write two characteristics of Web 2.0.</td><td><b>1</b></td></tr>
<tr><td></td><td><b>Ans</b></td><td>● Makes web more interactive through online social medias
● Supports easy online information exchange
● Interoperability on the internet
● Video sharing possible in the websites</td><td></td></tr>
</table>

OR

Any two of the above or any other two correct characteristics of Web 2.0

(½ Mark each for any two correct answers)

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

Ans

Trojan Horse	Computer Worm
It is a "Malware" computer program presented as useful or harmless in order to induce the user to install and run them.	It is a self-replicating computer program which uses a network to send copies of itself to other computers on the network and it may do so without any user intervention.

OR

Any other correct difference between Trojan Horse and Computer Worm

(1 Mark for writing correct difference between Trojan Horse and Computer Worm)
OR
(½ Mark each for writing correct explanation of Trojan Horse / Computer Worm)

(f) Categories the following under Client side and Server Side script category? **1**

(i) Java Script
(ii) ASP
(iii) VB Sript
(iv) JSP

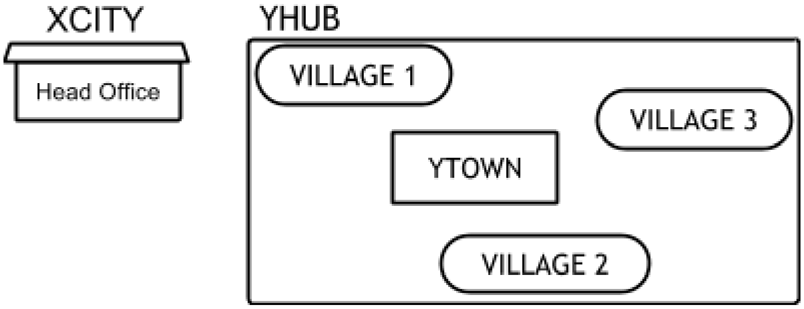
Ans

Client Side Scripts	**Server Side Scripts**
VB Script	ASP
Java Script	JSP

(1 Mark for correct answer)
OR
(½ Mark for any two correct client/server side script names)

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

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



Shortest distances between various locations:

VILLAGE 1 to YTOWN	2 KM
VILLAGE 2 to YTOWN	1.5 KM
VILLAGE 3 to YTOWN	3 KM
VILLAGE 1 to VILLAGE 2	3.5 KM
VILLAGE 1 to VILLAGE 3	4.5 KM
VILLAGE 2 to VILLAGE 3	3.5 KM
CITY Head Office to YHUB	30 Km

Number of Computers installed at various locations are as follows:

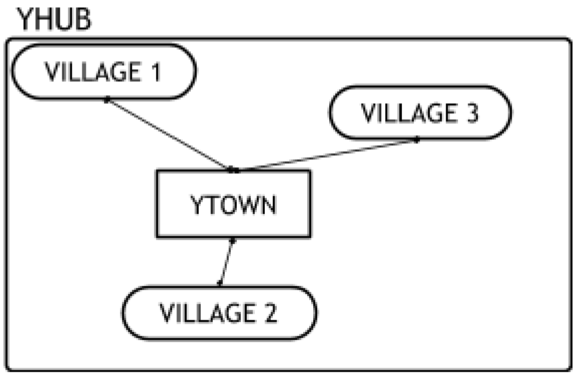
YTOWN	100
VILLAGE 1	10
VILLAGE 2	15
VILLAGE 3	15
CITY OFFICE	5

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

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

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

Ans YTOWN

		Justification ● Since it has the maximum number of computers. ● It is closest to all other locations.	
		(½ Mark for correct answer) ***(½ Mark for any one correct justification)***	
	(ii)	Suggest the best wired medium and draw the cable layout (location to location) to efficiently connect various locations within the YHUB.	**1**
	Ans	Optical Fiber	
			
		(½ Mark for correct wired medium) ***(½ mark for correct topology)***	
	(iii)	Which hardware device will you suggest to connect all the computers within each location of YHUB?	**1**
	Ans	Switch OR Hub	
		(1 Mark for correct answer)	
	(iv)	Which service/protocol will be most helpful to conduct live interactions of Experts from Head Office and people at YHUB locations?	**1**
	Ans	**Videoconferencing OR VoIP OR any other correct service/protocol**	
		(1 Mark for writing any one of the above answers)	