

KENDRIYA VIDYALAYA SANGATHAN
MODEL QUESTION PAPER-3
CLASS – XII
SUBJECT – COMPUTER SCIENCE

Time allowed : 3 hours

Maximum marks: 70

Blue Print For Class XII CS													
Topic		Knowledge					Understanding			Application			
		SA (1)	SA (2)	LA(3)	LA(4)	SA (1)	SA (2)	LA(3)	LA(4)	SA (1)	SA (2)	LA(3)	LA(4)
Programmming in C++			1			1	2			1	4	3	1
Data Structure					1				1		1	1	1
Database and SQL			1			3				4			
Boolean Algebra			1				1				2		
Communication and Network Concepts		1	2							3			

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1.

- (a) Differentiate between a Run Time Error and Syntax Error. Also give suitable examples of each in C++. 2
- (b) Name the header file(s) that shall be needed for successful compilation of the following C++ code 1 void

```
main ( )
{
    char String [20];
    cin>>String;
    strcat (String, "CBSE");
    cout<<setw(35)<< (String);
}
```

- (c) Rewrite the following program after removing the syntactical error(s) if any. Underline each correction. 2

```
# include <iostream.h>
const int Max 10;
void main ( )
{
    int N [Max]= { 20, 50,10, 30,40 } ;
    for (Loc= Max-1 ; Loc >= 0 ; Loc - -)
    cout>>N [Loc];
}
```

- (d) Find the output of the following program :

2

```
# include < iostream.h>
void main ()
{
    intArray[] = {4,6,10,12};
    int *pointer = Array ;
    for (int I=1 ; I<=3 ; I++)
    {
        cout<<*pointer<<"#";
        pointer ++;
    }
}
```

```

    }
    cout<<endl;
    for (I=1 ; I<=4 ; I++)
    {
        (*pointer)*=3 ;
        -- pointer;
    }
    for(I=1; I<5; I + + )
    cout << Array [I-1] << "@";
    cout << endl;
}

```

(e) Find the output of the following program :

3

```

#include <iostream.h>
void Withdef (int HisNum = 30)
{
    for (int I=20 ; I<*= HisNum; I+=5)
    cout<<I<<" ";
    cout<<endl;
}
void Control (int &MyNum)
{
    MyNum+=10;
    Withdef(MyNum);
}
void main ()
{
    int YourNum=20;
    Control (YourNum);
    Withdef();
    cout<<"Number="<<YourNum<<endl;
}

```

(f) In the following C++ program what is the expected value of MyMarks from Options (i) to (iv) given below. Justify answer.

2

```

#include<stdlib. h >
#include<iostream. h>
void main ()
{
    randomize ();
    int Marks [ ]= {99, 92, 94, 96, 93, 95}, MyMarks;
    MyMarks = Marks [1 + random (2) ];
    cout<<MyMarks<<endl;
}

```

(i) 99 (ii) 94

(iii) 96 (iv) None of the above

2. (a) Differentiate between Constructor and Destructor function in context of Classes and Objects using C++

2

(b) Answer the questions (i) and (ii) after going through the following class

2

```
class Maths
{
char Chapter [20];
int Marks;
public:
Maths ( ) //Member Function 1
{
strcpy (Chapter, "Geometry");
Marks = 10;
cout<<"Chapter Initialised";
{
~Math ( ) //Member Function 2
}
cout<<"Chapter Over";
}
};
```

(i) Name the specific features of class shown by Member Function 1 and Member Function 2 in the above example.

(ii) How would Member Function 1 and Member Function 2 get executed?

(c) Define a class Tour in C++ with the description given below :

3

Private Members :

- TCode of type string
- NoofAdults of type integer
- NoofKids of type integer
- Kilometres of type integer
- TotalFare of type float

Public Members :

- A constructor to assign initial values as follows :
TCode with the word "NULL"
NoofAdults as 0
NoofKids as 0
Kilometres as 0
TotalFare as 0
- A function AssignFare () which calculates and assigns the value of the data member TotalFare as follows

For **each** Adult

Fare(Rs) For Kilometres

500 >=1000

300 <1000&>=500

200 <500

For **each** Kid the above Fare will be 50% of the Fare mentioned in the above table

For example :

If Kilometres is 850, NoofAdults = 2 and NoofKids = 3

Then TotalFare should be calculated as

NumofAdults * 300 + NoofKids * 150

i.e. $2*300 + 3*150=1050$

- A function EnterTour() to input the values of the data members TCode, NoofAdults, NoofKids and Kilometres; and invoke the Assign Fare() function.

- A function ShowTour() which displays the content of all the data members for a Tour.

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

4

```
class Trainer
{
char TNo [5], TName [20], Specialisation [10];
int Days;
protected :
float Remuneration;
void AssignRem (float);
public :
Trainer ( ) ;
void TEntry ( );
void TDisplay ( );
};
class Learner
{
char Regno [10], LName [20], Program [10];
Protected :
int Attendance, Grade;
public:
Learner ( );
void LEntry ( );
void LDisplay ( );
};
class Institute : public Learner, public Trainer
{
char ICode[10], IName [20]; (
public:
Institute ( );
void IEntry ( );
void IDisplay ( );
};
```

(i) Which type of Inheritance is depicted by the above example?

(ii) Identify the member function(s) that cannot be called directly from the objects of class Institute from the following

- TEntry()
- LDisplay()
- IEntry()

(iii) Write name of all the member(s) accessible from member functions of class Institute.

(iv) If class Institute was derived privately from class Learner and privately from class Trainer, then, name the member function(s) that could be accessed through Objects of class Institute

3. (a) Write a function in C++ which accepts an integer array and its size as arguments and replaces elements having odd values with thrice its value and elements having even values with twice its value.

Example : if an array of five elements initially contains the elements as

3, 4, 5, 16, 9

then the function should rearrange the content of the array as

9, 8, 15, 32, 27

3

(b) An array Array[20][15] is stored in the memory along the column with each element occupying 8 bytes. Find out the Base Address and address of the element Array[2][3] if the element Array [4] [5] is stored at the address 1000.

3

(c) Write a function in C++ to delete a node containing Book's information, from a dynamically allocated Stack of Books implemented with the help of the following structure.

4

struct Book

```
{
int BNo;
char BName[20];
Book *Next;
};
```

(d) Write a function in C++ which accepts a 2D array of integers and its size as arguments and displays the elements which lie on diagonals.

2

[Assuming the 2D Array to be a square matrix with odd dimension

i.e. 3×3, 5×5, 7×7 etc.]

Example, if the array content is

5 4 3

6 7 8

1 2 9

Output through the function should be :

Diagonal One : 5 7 9

Diagonal Two : 3 7 1

(e) Evaluate the following postfix notation of expression, show status of stack for each operation

500,20,30,+,10,*,+

3

Q. 4.

a. `void main()`
`{` `char ch='A';`
 `fstream f(" trial.dat", ios::app);`
 `f<<ch;`
 `int p=f.tellg();`
 `cout<<p;`

 `}`

What is the output if the file content before the execution of the program is the string "ABC" 1

- b. Write a program in C++ to count the occurrence of word this in the file "story.txt". 3
- c. Write a function to copy all the records present in the file "Items.dat" into "Items_new.dat". 2

5. (a) What are DDL and DML? 2

(b) Consider the following tables. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii) 6

TABLE:SENDER

SenderID	SenderName	SenderAddress	SenderCiry
ND01	RJain	2ABCAppts	NewDelhi
MU02	HSinha	12Newtown	Mumbai
MU15	SJha	27/AParkStreet	Mumbai
ND50	TPrasad	122KSDA	NewDelhi

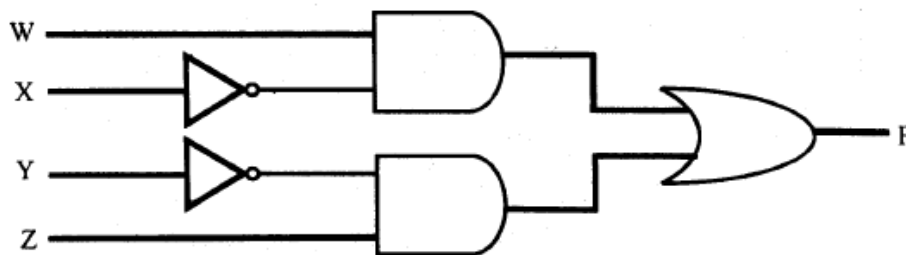
TABLE : RECIPIENT

RecID	SenderID	RecName	RecAddress	RecCiry
KO05	ND01	RBajpayee	5CentralAvenue	Kolkata
ND08	MU02	SMahajan	116AVihar	NewDelhi
MU19	ND01	HSingh	2AAndheriEast	Mumbai
MU32	MU15	PKSwamy	B5CSTerminus	Mumbai
ND48	ND50	STripathi	13B1DMayurVihar	NewDelhi

- (i) To display the names of all Senders from Mumbai
- (ii) To display the RecID), SenderName, SenderAddress, RecName, RecAddress for every Recipient
- (iii) To display Recipient details in ascending order of RecName

- (iv) To display number of Recipients from each city
 (v) `SELECT DISTINCT SenderCity FROM Sender;`
 (vi) `SELECT A. SenderName, B.RecName`
 `FROM Sender A, Recipient B`
 `WHERE A. SenderID = B.SenderID AND B.RecCity = 'Mumbai';`
 (vii) `SELECT RecName, RecAddress`
 `FROM Recipient`
 `WHERE RecCity NOT IN ('Mumbai', 'Kolkata');`
 (viii) `SELECT RecID, RecName`
 `FROM Recipient`
 `WHERE SenderID='MU02' OR SenderID='ND50';`

6. (a) State Distributive law and verify the same using truth table. 2
 (b) Write the equivalent Canonical Sum of Product expression for the following Product of Sum Expression 1
 $F(X,Y,Z) = \pi(1,3,6,7)$
 (c) Write the equivalent Boolean Expression for the following Logic Circuit. 2



- (d) Reduce the following Boolean expression using K-Map 3
 $F(U,V,W,Z) = \sum(0, 1, 2, 3, 4, 10, 11)$

7. a) Name any two transmission media. 1
 b) Write full form of the following abbreviations 2
 i) HTTP ii) FTP iii) IMAP iv) WAN
 c) Define MOSIAC and Usenet. 2
 d) INDIAN PUBLIC SCHOOL in Darjeeling is setting up the network between its different wings. There are 4 wings named as SENIOR(S), JUNIOR(J), ADMIN(A) and HOSTEL(H). Distance between various wings are given below:

Wing A to Wing S	100m
Wing A to Wing J	200m
Wing A to Wing H	400m
Wing S to Wing J	300m
Wing S to Wing H	100m
Wing J to Wing H	450m

Number of Computers

Wing A	10
Wing S	200
Wing J	100
Wing H	50

- i. Suggest a suitable Topology for networking the computer of all wings. 1
 - ii. Suggest the placement of Hub/Switch in the network. 1
 - iii. Mention an economic technology to provide internet accessibility to all wings. 1
 - iv. In which wing server will be installed. 1
- f. Write examples two open source software. 1

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MARKING SCHEME

1. (a) Run Time Error : Error occurring in a program during its execution. Program execution stops when such an error is encountered.

Example:

```
int A,B,C;
```

```
cin>>A>>B;
```

```
C=A/B;//Runtime error if value of B is zero.
```

Syntax Error: Error occurred due to wrong syntax of language detected by the compiler during compilation.

Example:

```
cin<<A;
```

(½ Mark for correct explanation of Error type

AND

(½ Mark for correct example of Error)

OR

(2 Marks for correct examples and the difference between Runtime Error and Syntax Error)

(b) string.h

iomanip.h

(½ Marks for identifying 2 correct header files)

```
(c) #include<iostream.h>
const int Max = 10; //OR const int Max = 5;
void main()
{
int N[Max]= {20,50,10,30,40};
// OR int N[]= {20,50,10,30,40};
int Loc;
for(Loc=Max-1; Loc>=0; Loc--)
cout<<N[Loc];
}
```

(½ Marks for each correction)

OR

(1 Mark for identifying at least three errors)

(d) 4 # 6 # 10 #

12 @ 18 @ 30 @ 36 @

(1 Mark for each correct line)

(e) 20,25,30,

20,25,30,

Number=30

(1 Mark for each correct line of output)

(f) (ii) 94

(1 Mark for correct answer)

(1 Mark for correct justification)

2. (a) Constructors:

- Name of the constructor functions is same as the name of the class
- No return type required for constructor function.
- Constructor functions are called automatically at the time of creation of the object
- Constructors can be overloaded
- Constructor functions are defined in public.

Destructors:

- Name of the destructor is same as the name of the class preceded by ~
- No return type required for destructor function.
- Destructor functions are called automatically when the scope of the object gets over
- Destructor can not be overloaded
- Destructor function is defined in public.

(1 Mark for correct explanation of Constructor)

(1 Mark for correct explanation of Destructor)

OR

(1 Mark for any example of a Constructor)

(1 Mark for any example of a Destructor)

(b) (i) Function 1: Constructor OR Default Constructor

Function 2: Destructor

(½ Marks for each correct answer)

(ii) Function 1 is executed or invoked automatically when an object of class Maths is created.

Function 2 is invoked automatically when the scope of an object of class Maths comes to an end.

OR

Example:

```
{  
Maths s1; //Constructor is invoked  
} //Destructor is invoked
```

(½ Mark for correct answer through explanation)

(c) class Tour

```
{  
char TCode[10]; //OR char *Tcode;  
int NoofAdults;  
int NoofKids;  
int Kilometres;  
float TotalFare;  
public:  
Tour()  
{  
strcpy(TCode,"NULL"); //OR TCode[0]='\0'OR strcpy(TCode,"\0")  
//OR TCode=NULL if TCode is declared as char pointer  
NoofAdults = 0;  
NoofKids = 0;  
Kilometres = 0;  
TotalFare = 0;  
}  
void AssignFare();  
void EnterTour();  
void ShowTour();  
};  
void Tour::AssignFare()  
{  
if(Kilometres>=1000)  
TotalFare = 500*NoofAdults+250*NoofKids;  
else if (Kilometres >= 500)  
TotalFare = 300*NoofAdults+150*NoofKids;  
else  
TotalFare = 200*NoofAdults+100*NoofKids;  
}  
void Tour::EnterTour()  
{  
gets(TCode); // or cin >> TCode;  
cin>>NoofAdults>>NoofKids>>Kilometres;  
AssignFare( );  
}  
void Tour::ShowTour()  
{  
cout<<TCode<<NoofAdults<<NoofKids<<Kilometres<<TotalFare<<endl;  
}  
}
```

(½ Mark for correct syntax for class header)

(½ Mark for correct declaration of data members)

(1 Mark for correct definition of constructor)

(½ Mark for condition checking in AssignFare())

(½ Mark for calculation of correct TotalFare for each condition)

(½ Mark for correct EnterTour() with proper invocation of AssignFare())

(½ Mark for displaying all data Members including TotalFare inside ShowTour())

(d) (i) Multiple Inheritance

(1 Mark for correct answer)

(ii) None

OR

All the above functions can be called.

(1 Mark for correct answer)

(iii) **Data Members:** ICode, IName, Attendance, Grade, Remuneration

Member Functions: IEntry(), IDisplay(), LEntry(), LDisplay(), AssignRem(), TEntry(), TDisplay()

(1 Mark for correct members)

(iv) IEntry(), IDisplay()

(1 Mark for correct answer)

3. (a) void Replace(int Arr[], int Size)

```
{  
for(int i =0; i<Size; i++)  
if(Arr[i]%2 != 0 )  
Arr[i] *= 3;  
else  
Arr[i] *= 2;  
}
```

(½ Mark for correct Function Header with proper Arguments)

(½ Mark for correct loop)

(1 Mark for checking Even / Odd values)

(1 Mark for replacing with proper values)

(b) Address of Array[i][j] along the column =

Base Address + W [(i – L1) + (j – L2) * M]

where,

W = size of each location in bytes = 8

L1 = Lower Bound of rows = 0

L2 = Lower Bound of columns = 0

M = Number of rows per column = 20

Address of Array[4][5] = Base Address + 8 [(4 – 0) +(5 – 0) * 20]

1000 = Base Address + 8 [104]

Base Address = 1000 – 8 x 104

= 1000 – 832

= 168

Address of Array[2][3] = 168 + 8 [(2 – 0) + (3 – 0) x 20]

$$= 168 + 8 \times 62$$

$$= 168 + 496$$

$$= 664$$

OR

Address of Array[i][j] along the column =

$$\text{Base Address} + W [(i - L1) + (j - L2) * M]$$

where,

W = size of each location in bytes = 8

L1 = Lower Bound of rows = 1

L2 = Lower Bound of columns = 1

M = Number of rows per column = 20

$$\text{Address of Array}[4][5] = \text{Base Address} + 8 [(4 - 1) + (5 - 1) * 20]$$

$$1000 = \text{Base Address} + 8 [83]$$

$$\text{Base Address} = 1000 - 8 \times 83$$

$$= 1000 - 664$$

$$= 336$$

$$\text{Address of Array}[2][3] = 336 + 8 [(2 - 1) + (3 - 1) \times 20]$$

$$= 168 + 8 \times 41$$

$$= 168 + 328$$

$$= 496$$

(1 Mark for writing correct formula)

(1 Mark for calculating correct Base Address)

(1 Mark for calculating correct Address of Arr[3][2])

(c) class Stack

```
{
Book *Top;
public:
Book() //Constructor to initialize Top
{ Top = NULL; }
void Push(); //Function to insert a node
void Pop(); //Function to delete a node
void Display(); //Function to display nodes of Stack
~Book(); //Destructor to delete all nodes
};
void Stack::Pop( )
{
if (Top != NULL)
{
Stack *Temp;
Temp = Top;

//Ignore the following line while evaluation
cout<<Top->Bno<<Top->Bname<<"deleted"<<endl;
Top = Top ->Next;
delete Temp;
}
else
cout<<"Stack Empty";
```

```

}
OR
void Pop(Book *&Top)
{
if(Top!=NULL)
{
Book *Temp = Top;
Top = Top ->Next;
delete Temp;
}
else
cout<<"Stack Empty";
}
(½ Mark for declaring Top as member )
(½ Mark for correct function header)
(1 Mark for checking Underflow)
(1 Mark for reassigning Top)
(1 Mark for deleting node)

```

```

(d) void Diagonals(int Arr[][100], int Size)
{
int Row, Col;
cout<<"Diagonal One: ";
for (Row = 0; Row < Size; Row++)
for (Col = 0; Col < Size; Col++)
if (Row == Col)
cout<<Arr[Row][Col];
cout<<"Diagonal Two: ";
for (Row = 0; Row < Size; Row++)
for (Col = 0; Col < Size; Col++)
if (Row + Col == Size - 1)
cout<<Arr[Row][Col];
}

```

```

OR
void Diagonals(int Arr[][100], int Size)
{
int Loc;
cout<<"Diagonal One: ";
for (Loc = 0; Loc < Size; Loc++)
cout<<Arr[Loc][Loc];
cout<<"Diagonal Two: ";
for (Loc = 0; Loc < Size; Loc++)
cout<<Arr[Loc][Size-Loc-1];
}

```

(½ Marks for correct function header)
(½ Marks for correct loop(s))
(½ Marks for checking right diagonal elements)
(½ Marks for checking left diagonal elements)

(e) Operator Scanned Stack Content

Scanned Elements	Operation	Stack
------------------	-----------	-------

500	Push 500	500
20	Push 20	500 20
30	Push 30	500 20 30
+	Pop 30	
	Pop 20	
Calculate 20+30=50	Push 50	500 50
10	Push 10	500 50 10
*	Pop 10	
	Pop 50	
Calculate 50*10=500	Push 500	500 500
+	Pop 500	
	Pop 500	
Calculate 500+500=1000	Push 1000	1000

Thus answer=1000

(2 Marks is to be given for correct answer with step wise evaluation)

4. (a) 4

***(1/2 Mark for correct answer and
1/2 mark for a brief explanation)***

```
(b) void main()
{
ifstream fi;
fi.open("story.txt");
char word[10];
int C =0;
while(!fi.eof())
{
fi>>word;
if(strcmpi(word,"this")==0)
C++;
}
cout<<C;
fi.close();
}
```

OR

Any other correct definition

(1/2 Marks for opening story.txt correctly)

(1/2 Marks for reading each word from the file)

(1/2 Marks for comparing with "this" / "This" / "THIS")

(1/2 Marks for printing the count of the word)

```
(c) void Copy_rec()
{
Item I;
ifstream f1;
f1.open("items.dat", ios::binary);
ofstream f2;
```



```
f2.open("Items_new.dat", ios::binary);
while(f1.read((char*)&I, sizeof(Item)))
{
f2.write((char*)&I,sizeof(Item));
}
f1.close();
f2.close();
}
```

(1/2 Marks for opening Items.dat correctly)

(1/2 Marks for opening Items_new.dat correctly)

(1/2 Marks for reading each record from Items.dat)

(1/2 Marks for checking end of file till the records are there in the file)

(1/2 Marks for writing the record to Items_new.dat)

(1/2 Marks for closing both the files)

5. (a) DDL provides statements for creation and deletion of tables/views/indexes e.g. create table etc.

whereas the DML provides statements to enter, update, delete data and perform complex queries on these tables e.g. insert into.

(1 Mark for correct definition of DDL with example)

(1 Mark for correct definition of DML with example)

(b) (i) SELECT SenderName from Sender WHERE City = 'Mumbai';

(ii) SELECT R.RecID, S.SenderName, S.SenderAddress, R.RecName, R.RecAddress FROM Sender S, Recipient R WHERE S.SenderID = R.SenderID;

(iii) SELECT * FROM Recipient ORDER BY RecName;

(iv) SELECT COUNT(*) FROM Recipient GROUP BY RecCity

(v) SenderCity

Mumbai

New Delhi

(vi) A.SenderName B.RecName

R Jain H Singh

S Jha P K Swamy

(vii) RecName RecAddress

S Mahajan 116, A Vihar

S Tripathi 13, Bl D, Mayur Vihar

(viii) RecID RecName

ND08 S Mahajan

ND48 S Tripathi

(Part (i) to (iv) - 1 Mark for each correct query)

(Part (v) to (viii) - 1/2 Marks for each correct output)

6. (a) If X,Y,Z are Boolean Variables then

$X \cdot (Y + Z) = X \cdot Y + X \cdot Z$

OR

$X + Y \cdot Z = (X + Y) \cdot (X + Z)$

X	Y	Z	Y+Z	X.(Y+Z)	X.Y	X.Z	X.Y+X.Z
----------	----------	----------	------------	----------------	------------	------------	----------------

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

VERIFIED

(1 Mark for stating any one of the Distributive Law correctly)

(1 Mark for verification using Truth Table)

(b) $F(X,Y,Z) = \sum(0,2,4,5)$

$$= X' \cdot Y' \cdot Z' + X' \cdot Y \cdot Z' + X \cdot Y' \cdot Z' + X \cdot Y' \cdot Z$$

(2 Marks for correct expression)

OR

(1 Mark, if a reduced non-canonical SOP expression is given)

(c)

$$F = W \cdot X' + Y' \cdot Z$$

(2 Marks for correct expression)

OR

(½ Mark each for $W \cdot X'$ and $Y' \cdot Z$)

(d)

	U'V'	U'V	UV	UV'
W'Z'	1 0	1 4	12	8
W'Z	1 1	5	13	9
WZ	1 3	7	15	11
WZ'	1 2	6	14	10

$$F = U' \cdot V' + W \cdot V' + U' \cdot W' \cdot Z'$$

(½ Mark for drawing correct K-Map)

(½ Mark for plotting 1's correctly)

(½ Mark for correct grouping)

(½ Mark for correct Answer)

7. (a) Fiber Optics and Ethernet cable

- b)
 - i) Hyper text transfer protocol
 - ii) file transfer protocol
 - iii) internet mail access protocol
 - iv) Wide Area Network
- c) i) MOSIAC is an internet Browser.
 - ii) Usenet is a group of individuals sharing a particular interest to discuss views, regarding their interest ie., newsgroup.
- d) i) LAN
 - ii) In all Wings
 - iii) Ethernet Cabling
 - iv) Wing C
- e) 1. Mysql 2. PHP