विद्या सर्वार्थ साधिका

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PRACTICE TEST

Class : XII

Subject: Computer Science (Old) M.M: 70

Date : 26/12/2019 Time: 3 Hour

Instructions : (1) All questions are compulsory.
(2) Programming language : C++.

Q-1 A Write the names of any four fundamental data types of C++. (2)

B Write the names of the correct header files, which must be included In the following C++ code to compile the code successfully : (2)

```
void main()
{
    char L[]="CS 2018";
    int N=strlen(L);
    cout<<L[N-1];
}
```

C Rewrite the following **C++ program** after removing any/all syntactical error(s). Underline each correction done in the code (2)

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

```
#define Area(L,B) = L*B
structure Recta
{
    int Length,Breadth;
};
void main()
{
    Recta R = [10,15];
    cout<<Area(Length.R,Breadth.R);
}
```

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.

```
void Alter(char *S1, char *S2)
{
    char *T;
    T=S1;
    S1=S2;
    S2=T;
    cout<<S1<<"&"<<S2<<end1;
}
void main()
{
    char X[]="First", Y[]="Second";
    Alter(X,Y);
    cout<<X<<"*"<<Y<<end1;
}
```

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

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

```
void Convert(float &X, int Y=2)
{
    X=X/Y;
    Y=X+Y;
    cout<<X<<"*"<<Y<<endl;
}
void main()
```

```
{
    float M=15, N=5;
    Convert(M,N);
    Convert(N);
    Convert(M);
}
```

F Observe the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the minimum and maximum values that can possibly be assigned to the variable End. (2)

Note :

- Assume all the required header files are already being included in the code.
- The function random(N) generates any possible integer between0 and N-1 (both values included).

```
void main()
{
    randomize();
    int A[]={10,20,30,40,50,60,70,80};
    int Start = random(2) + 1;
    int End = Start + random(4);
    for(int I=Start; I<=End, I++)
        cout<<A[I]<<"$";
}
```

(i) 10$20$30$ (ii) 20$30$40$50$60$

(iii) 30$40$50$60$ (iv) 40$50$60$70$

Q-2 A Given the following class Test and assuming all necessary header file(s) included, answer the questions that follow the code :

```
class Test
{
        int Marks; char TName[20];
    public:
        Test(int M) //Function 1
        {   Marks = M;  }
        Test(char S[]) //Function 2
        {   strcpy(TName,S);  }
        Test(char S[], int M) //Function 3
        {
            Marks = M;
            strcpy(TName,S);
        }
        Test(Test &T) //Function 4
        {    Marks = T.Marks + 10;
            strcpy(TName,T.TName);
        }
};
void main()
{
    Test T1(10); //Statement I
    Test T2(70); //Statement II
    Test T3(30, "PRACTICAL"); //Statement III
    _____; //Statement IV
}
```

(I) Which of the statement(s) out of (I), (II), (III), (IV) is/are incorrect for object(s) of the class Test? (1)

(II) What is Function 4 known as? Write the **Statement IV**, that would execute **Function 4**. (1)

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

Note : Assume all necessary files are included.

```
class Point                                                    (1)
{
    int X,Y;
    public:
    Point(int I=10, int J=20) //Function 1
```

```
    {   X = J;
        Y = I;
    }
    void Show() //Function 2
    {   cout<<" Points are "<< X <<"&"<< Y <<endl;  }
    ~Point() //Function 3
    {   cout<<"Points Erased"<<endl; }
};
void main()
{
    Point P(5);
    P.Show();
}
```

(i) For the class Point, what is **Function 3** known as ? When is it executed ? (1)

(ii) What is the output of the above code, on execution ?

(or)

(b) Explain Polymorphism in context of Object Oriented Programming. Also give a supporting example in C++. (2)

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

Private Members:

XUnit // integer

YUnit // integer

Type // char array of size 20

AssignType() /* Member function to assign value of Type based upon XUnit and YUnit as follows : */

Condition	**Type**
XUnit = 0 Or YUnit = 0	None
XUnit is more than YUnit	Bar
XUnit is less than or equal to YUnit	Line

Public Members:

InXY() /* Function to allow user to enter valuesof XUnit and YUnit and then invoke AssignType() to assign value of Type */

OutXY() // Function to display XUnit, Yunit and Type

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

```
class Ground
{
    int Rooms;
    protected:
    void Put();
    public:
    void Get();
};
class Middle : private Ground
{
    int Labs;
    public:
    void Take();
    void Give();
};
class Top : public Middle
{
   int Roof;
   public:
   void In();
   void Out();
};
void main()
{
   Top T;
```

}

(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 members**, which are directly accessible by the member function **Give()** of class **Middle**.

(III) Write the names of all the members, which are directly accessible by the member function Out() of class Top.

(IV) Write the names of **all the members**, which are directly accessible by the object **T** of class **Top** declared in the **main()**function.

(OR)

(d) Consider the following class HeadQuarter (4)

```
class HeadQuarter
{
      int Code;
      char Des[20];
      protected :
      char Address[40];
      public:
      void Get(){cin>>Code;gets(Des);gets(Address);}
      void Put(){cout<<Code<<Des<<Address<<endl;}
};
```

Write a code in C++ to protectedly derive another class FrontOffice from the base class HeadQuarter with following members.

Data Members

Location of type character of size 10
Budget of type double

Member Functions

A constructor function to assign Budget as 100000
Assign() to allow user to enter Location and Budget
Display() to display Location and Budget

3 (a) Write a user-defined function **NoTwoThree(int Arr[], int N)** inC++, which should display the value of all such elements and their corresponding locations in the array **Arr** (i.e. the array index), which are **not multiples of 2 or 3. N** represents the total number of elements in the array **Arr**, to be checked. (3)

Example : If the array Arr contains

0	1	2	3	4
25	8	12	49	9

Then the function should display the output as :
25 at location 0
49 at location 3

(OR)

(a) Write a user-defined function **ReArrange(int Arr[], int N)** in C++,which should swap the contents of the first half locations of the array **Arr** with the contents of the second half locations. **N** (which is an even integer) represents the total number of elements in the array **Arr**. (3)

Example :

If the array **Arr** contains the following elements (for **N = 6**)

0	1	2	3	4	5
12	5	7	23	8	10

Then the function should rearrange the array to become

0	1	2	3	4	5
23	8	10	12	5	7

NOTE :

- **DO NOT DISPLAY** the Changed Array contents.
- Do not use any other array to transfer the contents of array Arr.

(b) Write definition for a function **XOXO(char M[4][4])** in C++, which replaces every occurrence of an **X** with an **O** in the array, and vice versa.

For example :

ORIGINAL ARRAY M

X	X	O	X

CHANGED ARRAY M

O	O	X	O

O	X	O	O
O	O	X	X
X	X	O	O

X	O	X	X
X	X	O	O
O	O	X	X

NOTE :

- **DO NOT DISPLAY the Changed Array contents.**
- **Do not us**e any other array to transfer the contents of array M.

(OR)

(b) Write definition for a function **ColSwap(int A[4][4])** in C++, which swaps the contents of the first column with the contents of the third column. (2)

For example :

ORIGINAL ARRAY A

10	15	20	25
30	35	40	45
50	55	60	65
70	75	80	85

CHANGED ARRAY A

20	15	10	25
40	35	30	45
60	55	50	65
80	75	70	85

NOTE :

- **DO NOT DISPLAY** the Changed Array contents.
- Do not use any other array to transfer the contents of array A.

(C) Let us assume P[20][10] is a two-dimensional array, which is stored in the memory along the row with each of its elements occupying2 bytes, find the address of the element P[10][5], if the address of the element P[5][2] is 25000. (3)

(OR)

(C) Let us assume P[20][30] is a two-dimensional array, which is stored in the memory along the column with each of its elements occupying2 bytes. Find the address of the element P[5][6], if the base address of the array is 25000. (3)

(d) Write a user-defined function Pop(Book B[], int &T), which pops the details of a Book, from the static stack of Book B, at the location T (representing the Top end of the stack), where every Book of the stack is represented by the following structure : (4)

```
struct Book
{
        int Bno;
        char Bname[20];
};
```

(OR)

(d) For the following structure of Books in C++ (4)

```
struct Book
{
        int Bno;
        char Bname[20];
        Book *Link;
};
```

Given that the following declaration of class Book Stack in C++represents a dynamic stack of Books:

```
class BookStack
{
        Book *Top; //Pointer with address of Topmost Book of Stack
        public:
        BookStack()
        {
            Top = NULL;
        }
        void Push(); //Function to push a Book into the dynamic stack
        void Pop(); //Function to pop a Book from the dynamic stack
        ~BookStack();
};
```

Write the definition for the member function void BookStack::Push(), that pushes the details of a Book into the dynamic stack of BookStack.

(e) Evaluate the following Postfix expression, showing the stack contents : (2)

250, 45, 9, /, 5, +, 20, *, -

(OR)

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

A + B * C ^ D – E

4 (a) A text file named **MESSAGE.TXT** contains some text. Another text file named **SMS.TXT** needs to be created such that it would store **only the first 150 characters** from the file **MESSAGE.TXT**. (3)
Write a user-defined function **LongToShort()** in C++ that would perform the above task of creating **SMS.TXT** from the already existing file **MESSAGE.TXT**.

(OR)

(a) A text file named **CONTENTS.TXT** contains some text. Write a user-defined function LongWords() in C++ which displays all such words of the file whose length is more than 9 alphabets. For example : if the file **CONTENTS.TXT** contains :
"Conditional statements of C++ programming language are if and switch"
Then the function LongWords() should display the output as :
Conditional statements programming

(b) Write a user-defined function TotalPrice() in C++ to read each object of a binary file STOCK.DAT, and display the Name from all such records whose Price is above 150. Assume that the file STOCK.DAT is created with the help of objects of class Stock, which is defined below : (2)

```
class Stock
{
        char Name[20]; float Price;
        public:
        char* RName() { return Name; }
        float RPrice()    { return Price; }
};
```

(OR)

(b) A binary file DOCTORS.DAT contains records stored as objects of the following class : (2)

```
class Doctor
{
        int DNo; char Name[20]; float Fees;
        public:
        int *GetNo() { return DNo; }
        void Show()
        {
                cout<<Dno<<" * "<<Name<<" * "<<Fees<<endl;
        }
};
```

Write definition for function **Details(int N)** in C++, which displays the details of the Doctor from the file DOCTORS.DAT, whose DNo matches with the parameter N passed to the function.

(c) Find the output of the following C++ code considering that the binary file STOCK.DAT exists on the hard disk with the following 5 records for the class STOCK containing Name and Price. (1)

Name	Price
Rice	110
Wheat	60
Cheese	200
Pulses	170
Sauce	150

```
void main()
{
        fstream File
        File.open("STOCK.DAT",ios::binary|ios::in);
        Stock S;
        for (int I=1; I<=2; I++)
        {
            File.seekg((2*I-1)*sizeof(S));
            File.read((char*)&S, sizeof(S));
            cout <<"Read : "<< File.tellg()/sizeof(S)<< endl;
        }
        File.close();
}
```

(OR)

(c) Differentiate between seekg() and tellg(). (1)

5 Write SQL queries for (i) to (iv) and write outputs for SQL queries (v) to(viii), which are based on the table given below : (8)

Table : TRAINS

TNO	TNAME	START	END
11096	Ahimsa Express	Pune Junction	Ahmedabad Junction
12015	Ajmer Shatabdi	New Delhi	Ajmer Junction
1651	Pune Hbj Special	Pune Junction	Habibganj
13005	Amritsar Mail	Howrah Junction	Amritsar Junction
12002	Bhopal Shatabdi	New Delhi	Habibganj
12417	Prayag Raj Express	Allahabad Junction	New Delhi
14673	Shaheed Express	Jaynagar	Amritsar Junction
12314	Sealdah Rajdhani	New Delhi	Sealdah
12498	Shane Punjab	Amritsar Junction	New Delhi
12451	Shram Shakti Express	Kanpur Central	New Delhi
12030	Swarna Shatabdi	Amritsar Junction	New Delhi

Table : PASSENGERS

PNR	TNO	PNAME	GENDER	AGE	TRAVELDATE
P001	13005	R N AGRAWAL	MALE	45	2018-12-25
P002	12015	P TIWARY	MALE	28	2018-11-10
P003	12015	S TIWARY	FEMALE	22	2018-11-10
P004	12030	S K SAXENA	MALE	42	2018-10-12
P005	12030	S SAXENA	FEMALE	35	2018-10-12
P006	12030	P SAXENA	FEMALE	12	2018-10-12
P007	13005	N S SINGH	MALE	52	2018-05-09
P008	12030	J K SHARMA	MALE	65	2018-05-09
P009	12030	R SHARMA	FEMALE	58	2018-05-09

NOTE : All Dates are given in 'YYY-MM-DD' format.

(i) To display details of all Trains which Start from New Delhi.
(ii) To display the PNR, PNAME, GENDER and AGE of all Passengers whose AGE is below 50.
(iii) To display total number of MALE and FEMALE Passengers.
(iv) To display details of all Passengers travelling in Trains whose TNO is 12015.
(v) SELECT MAX (TRAVELDATE), MIN(TRAVELDATE) FROMPASSENGERS WHERE GENDER = 'FEMALE';
(vi) SELECT END, COUNT(*) FROM TRAINSGROUP BY END HAVING COUNT(*)>1;
(vii) SELECT DISTINCT TRAVELDATE FROM PASSENGERS;
(viii) SELECT TNAME, PNAME FROM TRAINS T, PASSENGERS PWHERE T.TNO = P.TNO AND AGE BETWEEN 50 AND 60;

6 (a) State any one Distributive Law of Boolean Algebra and verify it using truth table. (2)

(b) Draw the Logic Circuit of the following Boolean Expression : (2)
A.B+ A.C

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

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

(d) Reduce the following Boolean Expression to its simplest form using K-Map : (3)
$F(P,Q,R,S) = \sum(0,1,2,3,5,6,7,10,14,15)$

7 (a) Damodar Mohan has been informed that there had been a back door entry to his computer, which has provided access to his system through malicious user/programs, allowing confidential and personal information to be subjected to theft. It happened because he clicked a link provided in one of the pop- (2)

ups from a website announcing him to be winner of prizes worth 1 Million Dollars.
Which of the following has caused this out of the following ?
(i) Virus (ii) Worm (iii) Trojan Horse
Also, mention, what he should do to prevent this infection.

(b) Tarini Wadhawa is in India and she is interested in communicating with her uncle in Australia. She wants to show one of her own designed gadgets to him and also wants to demonstrate its working without physically going to Australia. Which protocol out of the following will be ideal for the same ? (1)

(i) POP3 (ii) SMTP
(iii) VoIP (iv) HTTP

(c) Give two differences between 3G and 4G telecommunication technologies. (1)

(d) Write the expanded names for the following abbreviated terms used in Networking and Communications : (2)

(i) MBPS (ii) WAN
(iii) CDMA (iv) WLL

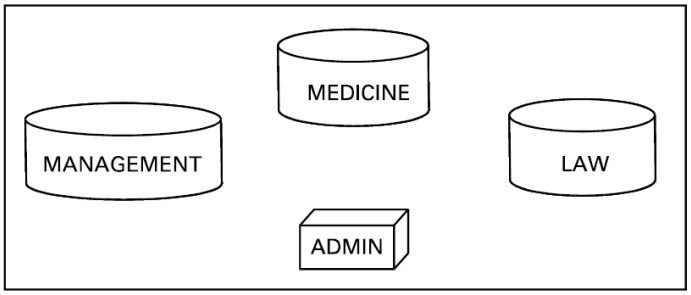
(e) Jonathan and Jonathan Training Institute is planning to set up its centre in Amritsar with four specialised blocks for Medicine, Management, Law courses along with an Admission block in separate buildings. The physical distances between these blocks and the number of computers to be installed in these blocks are given below. You as a network expert have to answer the queries as raised by their board of directors as given in (i) to (iv).

Shortest distances between various locations in metres :

Admin Block to Management Block	60
Admin Block to Medicine Block	40
Admin Block to Law Block	60
Management Block to Medicine Block	50
Management Block to Law Block	110
Law Block to Medicine Block	40

Number of Computers installed at various locations are as follows :

Admin Block	150
Management Block	70
Medicine Block	20
Law Block	50



(i) Suggest the most suitable location to install the main server of this institution to get efficient connectivity. (1)

(ii) Suggest the devices to be installed in each of these buildings for connecting computers installed within the building out of the following : (1)

- Modem
- Gateway
- Switch
- Router

(iii) Suggest by drawing the best cable layout for effective network connectivity of the blocks having server with all the other blocks. (1)

(iv) Suggest the most suitable wired medium for efficiently connecting each computer installed in every building out of the following network cables : (1)

- Co-axial Cable
- Single Pair Telephone Cable
- Ethernet Cable