

Pre-Board Examination 1- 2019-20

Sub: COMPUTER SCIENCE (283)

Class: XII

Marks: 70

Date:

Time: 3 hrs.

General Instructions:

1	All questions are compulsory.
2	Programming language: C++
3	Please check that this question paper contains 7 questions.
4	Please check that this question paper contains 10 printed pages.

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

(i) Struct (ii) return (iii) else (iv) stack

b) Observe the following C++ code and write the name(s) of the header file(s) which will be essentially required to run it in a C++ compiler: 1

```
void main ()
{
    char text[20],c;
    gets(text);
    c=tolower(text[0]);
    cout<<c<<"is the first char of "<<text<<endl;
}
```

c) Find the output of the following program: 2

```
#include<iostream.h>

struct Score
{
int Year;
float topper;
};
void change(Score *s,int x=20)
{
s->topper = (s->topper+25)-x;
s->Year++;
}
void main()
{
```

```

Score Arr[] = {{2007, 100},{2008,95}};
Score *Point = Arr;
change(Point,50);
cout<<Arr[0].Year<<"#"<<Arr[0].topper<<endl;
change(++Point);
cout<<Point->Year<<"#"<<Point->topper<<endl;
}

```

- 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 Change(X) X*2+100
void main()
{
    int A[]={20,25,22,27};
    int *Ptr=A, I;
    for(I=3; I>=0; I--)
        A[I]=Change(A[I]);
    for (I=0; I<=3; I++)
    {
        cout<<*Ptr<<"*";
        Ptr++;
    }
}

```

- e) 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 main()
{
    static int a[]={0,1,2,3,4};
    int *p[]={a,a+1,a+2,a+3,a+4};
    int **ptr=p;
    ptr++;
    cout<<ptr-p<<" "<<*ptr-a<<" "<<**ptr<<endl;
    *ptr++;
    cout<<ptr-p<<" "<<*ptr-a<<" "<<**ptr<<endl;
    *++ptr;
    cout<<ptr-p<<" "<<*ptr-a<<" "<<**ptr<<endl;
    ++*ptr;
    cout<<ptr-p<<" "<<*ptr-a<<" "<<**ptr<<endl;
    getch();
}

```

- f) Look at the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the highest and lowest values that can be assigned in the array T. 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 T[4], I;
    for(I=0; I<4;I++)
        T[I]=random(I+1)+1;
    for(I=3;I>=0;I--)
        cout<<T[I]<<"$";
}
```

- (i) 4\$3\$1\$1\$
- (ii) 0\$1\$2\$3\$
- (iii) 3\$2\$1\$0\$
- (iv) 1\$2\$3\$4\$

- 2 a) What do you understand by visibility modes in class derivations? 2

What are these modes?

- b) Answer the questions (i) and (ii) after going through the following class : 2

```
class Science
{ char Topic[20] ;
  int Weightage ;
public :

  Science () //Function 1
  { strcpy (Topic, "Optics") ;
    Weightage =30
    cout<<"Topic Activated";
  }
  ~Science() //Function 2
  { cout<<"Topic Deactivated"; }
};
```

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

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

c) Define a class BOOK in C++ with following description:

4

Private members

- BOOK_NO Integer type
- BOOK_TITLE 20 characters
- PRICE float (price per copy)
- TOTAL_COST() A function to calculate the total cost for N number of copies, where N is passed to the function as argument

Public members

- INPUT() Function to read BOOK_NO, BOOK_TITLE, PRICE
- PURCHASE() Function to ask the user to input the number of copies to be purchased. It invokes TOTAL_COST() and prints the total cost to be paid by the user.

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

4

```
class FRUIT
{
int FID;//Identification number
char type[20];
protected:
char Description[20];
float Cost;
public:
FRUIT();
void Set_values();
void Show_values();
};
class FRESH : public FRUIT
{
char color[10];
protected:
char Agent[20];
public:
FRESH( );
void Read_values();
void Display_values();
};
class DECORATIVE : protected FRUIT
{
float Dec_charges;
public:
void input();
void output();
};
```

- (i) Write the names of data members, which are accessible by objects of class type DECORATIVE.
- (ii) Write the names of all member functions, which are accessible by the member functions of class FRESH.
- (iii) Name the type Inheritance used in the above class?
- (iv) How many bytes will be required by an object of class type DECORATIVE?

- 3 a) Write a function TRANSFER(int A[], int B[], int Size) in C++ to copy the elements of array A into array B in such a way that all the negative elements of A appear in the beginning of B, followed by all the positive elements, followed by all the zeroes maintaining their respective orders in array A. 2

For example: If the contents of array A are: 7, -23, 3, 0, -8,-3,4, 0 The contents of array B should be -23 , -8, -3, 7, 3, 4, 0 ,0

- b) Write a function in C++ to print the sum of all the non-negative elements present on both the diagonal of a two dimensional array passed as the argument to the function. 2
- c) S[50][20] is a two dimensional array, which is stored in the memory along the row with each of its element occupying 4 bytes, find the address of the element S[5][15], if the element S[8][10] is stored at the memory location 62,000. 3
- d) Write a function pop() in C++ to perform a delete operation in a dynamically allocated stack containing names of countries. 4

The program is:

```
#include<iostream.h>
#include<stdio.h>
struct Node
{
char Country[30];
Node *Link;
};
class Stack
{
Node *Top;
public:
Stack(){Top = NULL;}
void Push();
void Pop();
void Display();
```

```
~Stack(); };
```

- e) Evaluate the following postfix expression. Show the status of stack after execution of each operation: 2
60, 6, /, 5, 2, *, 5, -, +
- f) Obtain the postfix notation for the following infix notation of expression showing the contents of the stack and postfix expression formed after each step of conversion: (P—Q)/(R*(S—T) +U). 2
- 4 a) Write function definition for COUNTNU() in C++ to read the content of a text file CONTENT.TXT, count the characters N and U (in lower case as well as upper case) present in the file. 2
e.g. Assume the content of the file CONTENT. TXT is as follows:

“New research shows that our closest evolutionary relatives have all of the cognitive, capacities required for cooking except an understanding of how to control fire.”

The function COUNTNU() should display the following:
“13”

- b) Write a definition for function FindAverage() in C++ to read each object of a binary file ITEMS.DAT, find Average Price of the Items stored in the file and display the same. Assume that the file ITEMS.DAT is created with the help of objects of class ITEMS, which is defined below : 3

```
class ITEMS
{
int INo; char IName[20]; float Price;
public:
void SHOWVAL()
{cout<<INo<<"#"<<IName<<"#"<<Price<<endl;}
float RPRICE() {return Price;}
};
```

NOTE :

Average Price = (Total Price of all Items) /Number of Items

- c) Find the output of the following C++ code considering that the binary file ITEMS.DAT exists on the hard disk with the following records of 10 Items for the class ITEMS. 1

```
class ITEMS
{
int INo; char IName[20]; float Price;
public:
void SHOWVAL()
{cout<<INo<<"#"<<IName<<"#"<<Price<<endl;}
```

```

float RPRICE() {return Price;}
};
void main()
{
    fstream FIN;
    FIN.open("ITEMS.DAT",ios::binary|ios::in);
    ITEMS ITM;
    FIN.seekg(5*sizeof(ITM));
    FIN.read((char*)&ITM, sizeof(ITM));
    cout<<"Record:"<<FIN.tellg()/sizeof(ITM)+ 1<<endl;
    FIN.seekg(0,ios::end);
    cout<<FIN.tellg()/sizeof(ITM);
    FIN.close();
}

```

d) Differentiate between ios::ate and ios::app mode.

- 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:

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 commands for (i) to (v) and write the outputs for (vi) to (viii) on the basis of tables INTERIORS and NEWONES.

TABLE:NEWONES

NO	ITEMNAME	TYPE	DATEOFSTOCK	PRICE	DISCOUNT
11	White wood	Double bed	23/03/03	20000	20
12	James007	Sofa	20/02/03	15000	15
13	Tom look	Baby cot	21/02/03	7000	10

TABLE: INTERIORS

NO	ITEM NAME	TYPE	DATEOFSTOCK	PRICE	DISCOUNT
1	Red rose	Double bed	23/02/02	32000	15
2	Soft touch	Baby cot	20/01/02	9000	10
3	Jerry'shome	Baby cot	19/02/02	8500	10
4	Rough wood	Office Table	01/01/02	20000	20
5	Comfort zone	Double bed	12/01/02	15000	20
6	Jerry look	Baby cot	24/02/02	7000	19
7	Lion king	Office Table	20/02/02	16000	20
8	Royal tiger	Sofa	22/02/02	30000	25
9	Park sitting	Sofa	13/12/01	9000	15
10	Dine paradise	DinningTable	19/02/02	11000	15

(i) To show all information about the sofas from the INTERIORS table.

(ii) To list ITEMNAME and TYPE of those items, in which DATEOFSTOCK is before 22/01/02 from the INTERIORS table in descending order of ITEMNAME.

(iii) To display ITEMNAME and DATEOFSTOCK of those items in which the Discount percentage is more than 15 from INTERIORS.

(iv) To count the number of items whose type is "Double bed";

(v) To insert new row in the NEWONES table with the following data: 14, "True Indian ", "Office Table ", 28/03/03, 15000, 20.

Give the outputs for the following SQL statements.

(vi) Select COUNT (distinct TYPE) from INTERIORS;

(vii) Select AVG(DISCOUNT) from INTERIORS where TYPE ="Baby cot";

(viii) Select SUM(price) from INTERIORS where DATEOFSTOCK<"12/02/02";

6 a) Verify the following using Boolean Laws

$$A'+ B'.C=A'.B'.C'+ A'.B.C'+ A'.B.C + A'.B'.C+ A.B'.C$$

2

b) Draw the logical circuits for the following using NAND gates only : 2
 $xy + xy'z + xyz$

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

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

d) Reduce the following Boolean expression using K-map: 3

$$G(U, V, W, Z) = \sum(0, 1, 3, 2, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15)$$

7 a) What out of the following, Arun will use to have an audio-visual chat 1
 with an expert sitting in a far-away place to fix-up a technical issue?

- i. VoIP
- ii. Email
- iii. FTP

b) What term we should use for a software/ hardware device, which is used 1
 to block, unauthorized access while permitting authorized communications? This term is also used for a device or set of devices configured to permit, deny, encrypt, decrypt, or proxy all (in and out) computer traffic between different security domains based upon a set of rules and other criteria.

c) Compare open source software and proprietary software. 1

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

- (i) GPRS (ii) WiFi (iii) POP (iv) SMTP

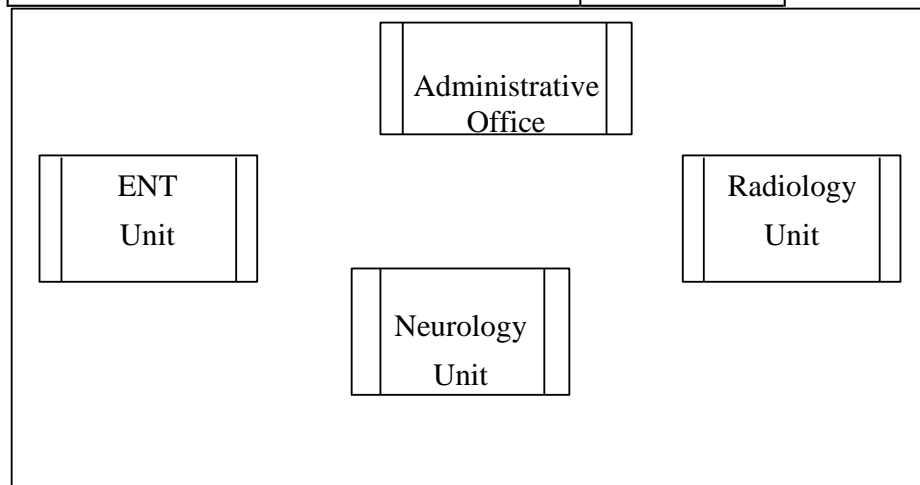
e) Medico Training Educational Institute is setting up its centre in 4
 Poona with four specialised units for Radiology, Neurology and ENT along with an administrative office in separate buildings. The physical distances between these units and the number of computers to be installed in these units and administrative office are given as follows. You as a network expert have to answer the queries as raised by them in (i) to (iv).

Shortest distances between various locations in metres :

Administrative Office to Radiology Unit	60
Neurology Unit to Administrative Office	40
Radiology Unit to Neurology Unit	80
ENT Unit to Neurology Unit	60
ENT Unit to Administrative Office	30
ENT Unit to Radiology Unit	120

Number of Computers installed at various locations are as follows :

ENT Unit	50
Radiology Unit	70
Administrative Office	120
Neurology	40



- (i) Suggest the most suitable location to install the main server of this institution to get efficient connectivity.
- (ii) Suggest the best cable layout for effective network connectivity of the building having server with all the other buildings.
- (iii) Suggest the devices to be installed in each of these buildings for connecting computers installed within the building out of the following:
 - Modem
 - Switch
 - Gateway
- (iv) Suggest the topology of the network and network cable for efficiently connecting each computer installed in each of the building out of the following :

Topologies : Star Topology, Bus Topology

Network Cable: Co-axial Cable, Ethernet Cable, and Single Pair Telephone Cable.