CBSE Class 12 Computer Science 2005 - Set 91/1

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours **Maximum Marks: 70**

General Instructions

(i) All questions are compulsory.

(ii) Programming language: C++.

Questions

1(a). Differentiate between a Call by Value and Call by Reference, giving suitable examples of each.

1(b). Name the header files to which the following belong: (i) abs( ) (ii) strcmp( )

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

```
#include<iostream.h>
const int Multiple 3;
void main ()
{
   Value=15;
   for (int Counter = 1;Counter=<5;Counter++,Value-=2)
      if (Value%Multiple==0)
         cout<<Value * Multiple;
         cout<<endl;
      else
         cout<<Value+Multiple<<endl;
}
```

1(d). Find the output of the following program:

```
#include<iostream.h>
struct MyBox
{
   int Length, Breadth, Height;
};
void Dimension (MyBox M)
{
   cout<<M.Length<<"x"<<M.Breadth<<"x";
   cout<<M.Height<<endl;
}
void main ()
{
   MyBox B1={10,15,5}, B2, B3;
   ++B1.Height;
   Dimension(B1);
   B3 = B1;
   ++B3.Length;
   B3.Breadth++;
   Dimension(B3);
   B2 = B3;
   B2.Height+=5;
   B2.Length--;
   Dimension(B2);
}
```

1(e). Find the output of the following program:

```
#include<iostream.h>
#include<string.h>
#include<ctype.h>
void Convert(char Str[],int Len)
{
   for (int Count =0; Count<Len; Count++ )
   {
      if (isupper (Str [Count] ) )
         Str[Count]= tolower(Str[Count]);
      else if (islower (Str [Count] ) )
         Str[Count]= toupper(Str[Count]);
      else if (isdigit (Str [Count]))
         Str[Count]= Str[Count] + 1;
      else Str[Count] = '*';
   }
}
void main ()
{
   char Text [] = "CBSE Exam 2005";
   int Size=strlen(Text);
   Convert(Text,Size);
   cout<<Text<<endl;
   for (int C = 0,R=Size-1;C<=Size/2; C++,R--)
   {
      char Temp = Text[C];
      Text [C] = Text [R] ;
      Text [R] = Temp;
   }
   cout<<Text<<endl;
}
```

1(f). Observe the following program SCORE.CPP carefully. If the value of Num entered by the user is 5, choose the correct possible output(s) from the options (i) to (iv), and justify your option.

```
//program : SCORE.CPP
#include<stdlib.h>
#include<iostream.h>
void main()
{
   randomize ();
   int Num, Rndnum;
   cin>>Num;
   Rndnum = random (Num) + 5;
   for (int N = 1; N<=Rndnum; N++)
      cout<<N<<" ";
}
```

(A) 1 2 3 4 (B) 1 2

(C) 1 2 3 4 5 6 7 8 9 (D) 1 2 3

2(a). Define the term Data Hiding in the context of Object Oriented Programming. Give a suitable example using a C++ code to illustrate the same.

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

```
class Test
{
   char Paper[20];
   int Marks;
public:
   Test ()                  // Function 1
   {
      strcpy (Paper, "Computer");
      Marks = 0;
   }
   Test (char P [] )        // Function 2
   {
      strcpy(Paper,P);
      Marks = 0;
   }
   Test (int M)             // Function 3
   {
      strcpy(Paper,"Computer");
      Marks = M;
   }
   Test (char P[], int M) // Function 4
   {
      strcpy (Paper, P);
      Marks = M;
   }
};
```

(i) Which feature of Object Oriented Programming is demonstrated using Function 1, Function 2, Function 3 and Function 4 in the above class Test?

(ii) Write statements in C++ that would execute Function 2 and Function 4 of class Test.

2(c). Define a class TravelPlan in C++ with the following descriptions:

Private Members:

Member	Type
PlanCode	long
Place	character array (string)
Number_of_travellers	integer
Number_of_buses	integer

Public Members:

A constructor to assign initial values of Plan Code as 1001, Place as "Agra", Number_of_travellers as 5, Number_of_buses as 1

A function NewPlan( ) which allows the user to enter PlanCode, Place and Number_of_travellers. Also, assign the value of Number_of_buses as per the following conditions:

Number_of_travellers	Number_of_buses
Less than 20	1
Equal to or more than 20 and less than 40	2
Equal to 40 or more than 40	3

A function ShowPlan( ) to display the content of all the data members on screen.

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

```
class Medicines
{
   char Category[10];
   char Date_of_manufacture[10];
   char Company[20];
public:
   Medicines();
   void entermedicinedetails();
   void showmedicinedetails();
};
class Capsules: public Medicines
{
protected:
   char capsule_name[30];
   char Volume_label[20];
public:
   float Price;
   Capsules();
   void entercapsuledetails();
   void showcapsuledetails();
};
class Antibiotics: public Capsule
{
   int Dosage_units;
   char Side_effects[20];
   int Use_within_days;
public:
   Antibiotics();
   void enterdetails();
   void showdetails();
};
```

(i) How many bytes will be required by an object of class Medicines and an object of class Antibiotics respectively?

(ii) Write names of all the member functions accessible from the object of class Antibiotics.

(iii) Write names of all the members accessible from member functions of class Capsules.

(iv) Write names of all the data members, which are accessible from objects of class Antibiotics.

3(a). Write a function in C++ which accepts an integer array and its size as arguments/parameters and exchanges the values of first half side elements with the second half side elements of the array.

Example:

If an array of eight elements has initial content as

2, 4, 1, 6, 7, 9, 23, 10

The function should rearrange the array as

7, 9, 23, 10, 2, 4, 1, 6

3(b). An array Arr[15][35] is stored in the memory along the column with each of its elements occupying 8 bytes. Find out the base address and the address of an element Arr[2][5], if the location Arr[5][10] is stored at the address 4000.

3(c). Write a function in C++ to perform a PUSH operation in a dynamically allocated stack considering the following:

```
struct Node
{
   int X, Y;
   Node *Link;
};
class STACK
{
   Node *Top;
public:
   STACK() {Top=NULL;}
   void PUSH();
   void POP();
   ~STACK();
};
```

3(d). Write a function in C++ to print the sum of all the values which are either divisible by 2 or are divisible by 3, present in a two-dimensional array passed as the argument to the function.

3(e). Evaluate the following postfix notation of expression:

10 20 + 25 15 - * 30 /

4(a). Observe the program segment given below carefully, and answer the question that follows:

```
class Book
{
   int Book_no;
   char Book_name[20];
public:
   //function to enter Book details
   void enterdetails();
   // function to display Book details
   void showdetails();
   //function to return Book_no
   int RBook_no() {return Book_no;}
};
void Modify(Book NEW)
{
   fstream File;
   File.open("BOOK.DAT",ios::binary|ios::in|ios::out);
   Book OB;
   int Recordsread = 0, Found = 0;
   while (!Found && File.read((char*)&OB, sizeof(OB)))
   {
      Recordsread++;
      if (NEW.RBook_no() == OB.RBook_no())
      {
         _____ //Missing Statement
         File.write((char*)&NEW, sizeof(NEW));
         Found = 1;
      }
      else
         File.write((char*)&OB, sizeof(OB));
   }
   if (!Found)
      cout<<"Record for modification does not exist";
   File.close();
}
```

If the function Modify( ) is supposed to modify a record in file BOOK.DAT with the values of Book NEW passed to its argument, write the appropriate statement for Missing Statement using seekp( ) or seekg( ), whichever needed, in the above code, that would write the modified record at its proper place.

4(b). Write a function in C++ to count and display the number of lines starting with alphabet 'A' present in a text file "LINES.TXT".

Example:

If the file "LINES.TXT" contains the following lines,

A boy is playing there.
There is a playground.
An aeroplane is in the sky.
Alphabets and numbers are allowed in the password.

The function should display the output as 3

4(c). Given a binary file STUDENT.DAT, containing records of the following class Student type

```
class Student
{
   char S_Admno[10];   //Admission number of student
   char S_Name[30];     //Name of student
   int Percentage;      //Marks Percentage of student
public:
   void EnterData()
   {
      gets(S_Admno);gets(S_Name);cin>>Percentage;
   }
   void DisplayData()
   {
      cout<<setw(12)<<S_Admno;
      cout<<setw(32)<<S_Name;
      cout<<setw(3)<<Percentage<<endl;
   }
   int ReturnPercentage(){return Percentage;}
};
```

Write a function in C++ that would read the contents of file STUDENT.DAT and display the details of those students whose Percentage is above 75.

5(a). What do you understand by the terms Primary Key and Degree of a relation in relational database?

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

TABLE: EMPLOYEES

EMPID	FIRSTNAME	LASTNAME
010	George	Smith
105	Mary	Jones
152	Sam	Tones
215	Sarah	Ackerman
244	Manila	Sengupta
300	Robert	Samuel
335	Henry	Williams
400	Rachel	Lee
441	Peter	Thompson

EMPID	ADDRESS	CITY
010	83 First Street	Howard
105	842 Vine Ave.	Losantiville
152	33 Elm St.	Paris
215	440 U.S. 110	Upton
244	24 Friends Street	New Delhi
300	9 Fifth Cross	Washington
335	12 Moore Street	Boston
400	121 Harrison St.	New York
441	11 Red Road	Paris

TABLE: EMPSALARY

5(b). (continued)

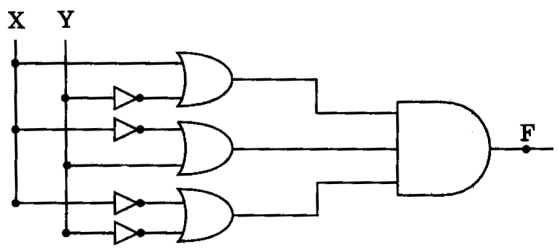
EMPID	SALARY	BENEFITS	DESIGNATION
010	75000	15000	Manager
105	65000	15000	Manager
152	80000	25000	Director
215	75000	12500	Manager
244	50000	12000	Clerk
300	45000	10000	Clerk
335	40000	10000	Clerk
400	32000	7500	Salesman
441	28000	7500	Salesman

(i) To display Firstname, Lastname, Address and City of all employees living in Paris from the table EMPLOYEES. (ii) To display the content of EMPLOYEES table in descending order of FIRSTNAME. (iii) To display the Firstname, Lastname, and Total Salary of all Managers from the tables EMPLOYEES and EMPSALARY, where Total Salary is calculated as Salary + Benefits. (iv) To display the Maximum salary among Managers and Clerks from the table EMPSALARY.

(v) SELECT FIRSTNAME, SALARY FROM EMPLOYEES, EMPSALARY WHERE DESIGNATION = 'Salesman' AND EMPLOYEES.EMPID = EMPSALARY.EMPID; (vi) SELECT COUNT(DISTINCT DESIGNATION) FROM EMPSALARY; (vii) SELECT DESIGNATION, SUM(SALARY) FROM EMPSALARY GROUP BY DESIGNATION HAVING COUNT(*)>2; (viii) SELECT SUM(BENEFITS) FROM EMPLOYEES WHERE DESIGNATION = 'Clerk';

6(a). State and verify the Associative law in Boolean Algebra.

6(b).



Write the equivalent Boolean expression for the following Logic Circuit:

6(c). Write the SOP form of a Boolean Function F, which is represented by the following truth table:

A	B	C	F
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

6(d). Reduce the following Boolean expression using K-Map:

$F(A, B, C, D) = \Pi(0, 1, 2, 3, 4, 5, 10, 11, 15)$

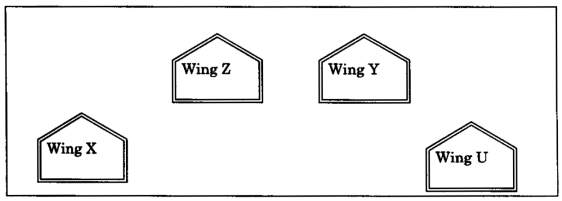
7(a). What is the difference between Message Switching technique and Packet Switching technique?

7(b). Expand the following terminologies:

(i) TCP/IP
(ii) XML
(iii) CDMA
(iv) WLL

7(c). Write two applications of Cyber Law.

7(d).



The Great Brain Organisation has set up its new Branch at Srinagar for its office and web based activities. It has 4 Wings of buildings as shown in the diagram:

Center to center distances between various blocks:

From	To	Distance
Wing X	Wing Z	50m
Wing Z	Wing Y	70m
Wing Y	Wing X	125m
Wing Y	Wing U	80m
Wing X	Wing U	175m
Wing Z	Wing U	90m

Number of Computers:

Wing	Computers
Wing X	50
Wing Z	30
Wing Y	150
Wing U	15

7(d)(i). Suggest a most suitable cable layout of connections between the Wings, and topology.

7(d)(ii). Suggest the most suitable place (i.e. Wing) to house the server of this organisation with a suitable reason, with justification.

7(d)(iii). Suggest the placement of the following devices with justification:

(1) Repeater
(2) Hub/Switch

7(d)(iv). The organization is planning to link its head office situated in Delhi with the offices at Srinagar. Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer.

- End of Question Paper -