Student Id:

Total Number of Pages: 2

B.TECH
BECS 2207

Third Semester Examination – 2014

OBECT ORIENTED PROGRAMMING

BRANCH: CSE/IT
Time: 3 Hours

Max marks: 70

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

[2 x 10]

1. Answer the following questions:

(a) Define the terms polymorphism in the context of object oriented programming. State the different categories of polymorphism.
(b) State the two primary characteristics of a static member function.
(c) What are the differences between a pointer variable and a reference variable?
(d) State the differences between the following two statements:
(i) int const *p; (ii) int *const p;
(e) What would be the value of variable x after executing the following code?
short int x = 1; cout<<~x; // assume short int reserves 2 bytes.
Give proper explanation to your answer.
(f) What does the following program print?

```
#include<iostream>
using namespace std;
void f(int *p,int *q)  { p=q; *p=2; }
int i=0, j=1;
int main() { f(&i,&j);  cout<<"i="<<i<<" j="<<j<<endl;  return 0; }
```

(g) What are the differences between new and malloc?
(h) Name the operators which can't be overloaded through a non member function.
(i) Name at least two instances when a copy constructor would be called.
(j) How can you restrict a function to throw a certain type of exception?

2. (a) Write a C++ program to create a class named as Sphere with radius as its attribute. The attribute need to be placed under protected visibility.
Provide a function to initialize this attribute. Provide another member method which finds out the volume of a sphere object and displays the value of the volume at the console. [5]

(b) Write a C++ program to create a class named as Student which contains private attributes named as stud_name, stud_id and stud_mark. Provide a constructor that would accept input from a user and initialize the attributes.
Provide another public interface that would display the initialized attributes. [5]

3. (a) What do you mean by function overloading? State the different ways to overload a function. Give proper programming examples. [5]

(b) Write a C++ program to create a class named as Triangle with three sides as its protected attributes. Provide a constructor to initialize these attributes.
Provide a public member function named as check_and_display() which would check whether the triangle is a right angled triangle or not and makes a call to another member function named as area() which would be overloaded to find out the area of a right angled triangle or any other triangle and displays the value. [5]

4. (a) Explain the concept of inheritance in C++. with an appropriate programming example. Explain the concept of multilevel inheritance. [5]

(b) How ambiguity can be resolved for multiple copies of a same attribute in case of multipath (diamond) inheritance using virtual base class? Explain with an example. [5]

5. (a) Write a complete program to create a class named as Container which contains an attribute of type double that could be used to calculate the volume of a container and a public pure virtual function named as volume().
Create two new classes named as Sphere and Cube from the above class. Implement dynamic polymorphism to find the volumes of a sphere and cube objects by redefining the volume () function. You can provide any other function to initialize the attribute and to display the volume. [5]

(b) What is a 'this' pointer? Suppose in a class an attribute name is same as that of a member function's local parameter. How the 'this' pointer is helpful in resolving the ambiguity in the above case? Explain with a proper programming example. [5]

6. (a) C++ does not provide any method to check array boundary crossing conditions. Develop a method to check array boundary conditions by overloading the array indexing operator. [5]

(b) Develop a C++ program where a user defined type variable can be subtracted from a double value and vice versa. The user defined type variable should contain only a single double attribute under protected visibility. [5]

7. (a) Create a class named as Employee with protected attributes such as emp_id and emp_salary. Take a constructor to initialize these attributes. Create an array of objects for the above class and initialize the attributes. The memory allocation for that array should take place at the run time. Provide appropriate method to display the initialized values. [5]

(b) What is a copy constructor? Why a const reference parameter is preferred than a normal reference parameter in case of a copy constructor? Explain with programming examples. [5]

8. (a) Write a program where a user defined function is capable of throwing exceptions of type character only. [5]

(b) Write a program which contains a generic function that can arrange elements of an array in descending order. [5]

Students Id: | | | | | | | | |

Total Number of Pages: 3

B.TECH
BECS2212

Third Semester Examination – 2014

Object Oriented Programming

BRANCH:EEE
Time: 3 Hours

Max marks: 70

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 **Answer the following questions.** 2×10

a) List out the characteristics of Object Oriented Programming.
b) What is the concept of encapsulation in Object Oriented Design?
c) What is "this" pointer?
d) Find the output of the following code snippet.

```
#include<iostream>
Using namespace std;
main(){
      int c[ ]={2.8,3.4,4,6.7,5};
      int j,*p=c,*q=c;
      for(j=0;j<5;j++){
            printf(" %d ",*c);
            ++q;
      }
      for(j=0;j<5;j++){
            printf(" %d ",*p);
            ++p;
      }
}
```

e) Find the output of the following code-snippet.

```
#include<iostream>
Using namespace std;

class Stocks{
         int number;
      public:
         static void picker( ){
                  number = 6;
```

```
        }
        int get_data(){
                return number;
        }
};

int main(){
        stocks ob;
        ob.picker();
        ob.get_data();
        return 0;
}
```

f) How the binary files are different from text file?

g) Write the syntax for new and delete operator in C++.

h) What is the role of constructor? Explain with an example.

i) Find the output of the following code snippet

```
#include<iostream>
Using namespace std;
int a = 25;
int main(){
        int a = 45;
        {
                int a = 10;
                Cout << a << : :a;
        }
        Cout << : :a << a;
}
```

j) Define Pure Virtual Function.

Q2 [5+5]

a) Create a Class called Time that has integer data's as hours, minutes, and seconds, declared as private. One constructor initializes these data fields to zero values, and another initializes it to some real values passed from objects. There is a member function called 'add_time()' which receives two Time objects as its arguments, to be added. Another member function display_time()' shows the time in the format hr:min:sec.
Design a main () program to create two objects T1, T2and they are added and result is stored into another object T3. Finally display the result.

b) Define the C++ feature: "Function with default arguments". Write a program to illustrate this concept with a suitable code.

Q3 [2+8]

a) What is Operator Overloading Explain?

Students Id: | | | | | | | | |

B.TECH
CS103

Total Number of Pages: 2

Third Semester Examination – 2016

Object Oriented Programming

BRANCH:IT
Time: 3 Hours

Max marks: 50

Answer Question No.1 which is compulsory and any eight from the rest.

The figures in the right hand margin indicate marks.

2×5

Q1 **Answer the following questions.**

a) What is the key idea to go for Object Oriented Programming?

b) Find the output of the following code snippet. Or Error.

```
#include<iostream>
Using namespace std;
class Stocks{
        int number;
    public:
        static void picker( ){
                number = 6;
        }
        int get_data(){
                return number;
        }
};
int main(){
        stocks ob;
        ob.picker();
        cout<< ob.get_data();
        return 0;
 }
```

c) Find the output of the following code snippet. Or Error.

```
#include <iostream>
int main(int argc, char **argv) {
    int *b, *y;
    b = new int[10];
    for(int i = 0; i < 5; i++)
        cout << "We are here\n";
    b[2,3*2,5] = 13;
    cout << b[5];
    y=b;
    delete[]y;
}
```

d) Explain Object Slicing with an example.

e) What is the use of virtual base class?

Q2] Create two classes DMC and DFI, which stores the values of distances in meters and centimeters and feet and inches respectively. Write a method *AddDistance_Friendly(...)*, that can read values for the class objects and add one object of DMC with another object of DFI. Use friend function to accomplish the job. The object that stores the result is a DMC object. Hence display the resultant distance in meters and centimeters. [5]

Q3] Define a class called Xstring that have char *Str, and int Sz, as its private members. The class holds a parameterized constructor to specify Sz: the length of the string, and allocate space to Str sufficient to hold a string. Method *Display_string()* to display the Xstring object. Exercise the main() function that instantiate objects S1, S2 and S3 of type Xstring. Overload the operator ' + ' such that S3 = S1 + S2 yield the resultant string in S3, which is the concatenation of first string with second one. Display the result. [5]

Q4] Create a template class Xvector, which contains a 1D array as its data member and its size Sz. The array may operate on both integral data as well as floating point data. Arrange a constructor that dynamically allocate memory to the array, and then fill it by user provided inputs. A method *Find_SecondMin( )* return the second minimum value in the list. Write the main() function to test the code. [5]

Q5] Write a program to illustrate the concept of Exception Handler in C++; when your program meets overflow or underflow conditions in a Stack data structure. Create a class Xstack, that realize the stack by an integer array: int stk[Max_Size] and Top. A constructor initializes the stack Top to -1. A method *void Push(int)* and *int Pop()* do push and pop operation respectively. In main() block, give call to Push and Pop. If an exception happens, prepare a catch( ) block to handle it. [5]

Q6] What is Copy Constructor? Write a suitable code to illustrate the concept of deep copy and swallow. Give the reasons why constant reference is passed as argument in copy constructor. [5]

Q7] Write a program to create an abstract class SHAPE with functions to find area and to display the name of the shape and other essential component of the class. Create derived classes CIRCLE, RECTANGLE each having its overridden versions to area() and display(). Write a suitable program to access these virtual functions trough a base class pointer. Give a brief explanation about the program in terms of vptr and vtable. [5]

Q8] a) Write a function that read the content of an existing text file, and copy it to another file using file stream. [3]

b) Discuss the following functions:
Seekg(), tellg() [2]

Q9] Write a program to overload the array bound ([ ]) operator, with a suitable coding example.[5]

Student Id | | | | | | | |

No. of Pages : 2

B Tech

Third Semester (End Sem) Examination - Nov 2016

C++ & Object Oriented Programming (CS103)

Branch : EEE

Time 3 Hours

Max Marks : 50

Answer Question **No.1** which is **compulsory** and any **four** from the rest.

The figures in the right hand margin indicate marks.

Q1. Answer the following questions: (1x10)

a) What are the basic concepts of OOP?
b) What is an Abstract class?
c) Name the operators that cannot be overloaded?
d) Define an inline function.
e) How can you use the concept of object slicing in C++ program?
f) Name the streams generally used for file I/O.
g) Differentiate between constructor and member function of a class.
h) What is the work of catch(...)?
i) What is pure virtual function? Explain with example.
j) What is the use of this( )?

Q2. (2x5)

a) What is a friend function? Write a program using friend function to add two member data of two different Class.
b) What do you mean by static class members? Explain the characteristics of static class members with a programming example.

Q3. (2x5)

a) Write a program to define virtual, non-virtual functions and determine size of the objects. Use base class pointer to call functions and provide the explanation on the output of the program?
b) Write a program to create swap( ) function using template.

Q4. (2x5)

a) Define a class Money, which maintains two integer data fields, dollars and cents. Overload the +, - operators to add operators for the class.
b) What is a constructor? Explain default, parameterized and copy constructor with example.

Q5. (2x5)

a) Categories the different types of exception. Narrate with suitable example how to handle an exception in C++.
b) Write a program to open a file in output and input mode. Accept data and write to the file. Display the contents of the file.

Q6. Write short notes on the following (4x2.5)

a) Namespace
b) Pointer to member function
c) new and delete operator
d) Hybrid inheritance

Student ID: | | | | | | | | | | |

B.TECH

Total Number of Pages: 2

3rd / 4th Semester Examination – December 2017
OBJECT ORIENTED PROGRAMMING USING C++

Time: 3 Hours
Max marks: 70
Answer all the questions.
The figures in the right hand margin indicate marks.

(2 x 10)

Q1 Answer the following questions:

a) What will be the output (assume int variable reserves 2 bytes)?

```
#include<iostream>
using namespace std;
int main(){ int x=1, y=2; cout<<~x<<!y<<endl; return 0; }
```

b) What does the following program print?

```
#include<iostream>
using namespace std;
void f(int *p,int *q)   { p=q;  *p=2; }
int i=0, j=1;
int main() {  f(&i,&j);   cout<<"i="<<i<<" j="<<j<<endl;   return 0;  }
```

c) What will be the output?

```
#include<iostream>
using namespace std;
int garr[4]={6,7};
int main() { int arr[4]={1,2}; cout<<arr[3]<<endl; cout<<garr[2]<<endl; return 0;}
```

d) What will be the output?

```
#include<iostream>
using namespace std;
class X { public: int i; X(int a) {i = a;}};
int main( ) { X *xptr = new X; xptr - >i = 10; cout<< xptr - >i ;  return 0;}
```

e) State the differences between new operator and malloc( ) function.

f) Name at least two instances when a copy constructor would be called.

g) Specify the requirements to implement function overloading.

h) What is the use of mutable keyword in C++?

i) What will be the output?

```
#include<iostream>
using namespace std;
class A{ int x, &y;
        public:     A(int a, int b):x(a),y(b){ }
                    void print{ cout<<"x="<<x<<" y="<<y<<endl; } };
int main( ) { A   ob(20);  ob.print(); return 0;  }
```

j) Specify the use of explicit keyword in C++.

Q2 a) Write a complete program to create a class named as **Candidate** with private attributes named as id and mark. Provide appropriate member function to initialize these attributes. Create an array of 25 candidates. Provide a method to arrange the candidate array in the increasing order of candidate mark. Then display the details of the sorted array of candidates. (5)

b) Write a complete program to create a class named as **Date** with private attributes named as day, month and year. The class contains a parameterized constructor to initialize the attributes. It also contains a public function named as showdate() to display the initialized values of the above attributes. Create at least one object of the class Date and display the initialized values of attributes of that object. (5)

Q3 a) Develop a c++ program where you can convert a primitive or built in type value such as int or char to a user defined type value such as class A or class X. (5)

b) Write a C++ program to create a class named as **Triangle** with three sides as its protected attributes. Provide a constructor to initialize these attributes. Provide a public member function named as check_and_display() which would check whether the triangle is a right angled triangle or not and makes a call to another member function named as area() which would be overloaded to find out the area of a right angled triangle or any other triangle and displays the value. (5)

Q4 a) Create a class called **Coordinate** which contains private int attributes such as x and y. It also contains methods named as getx() and gety() to initialize x and y along with another method named dispcoordinate() to display the x and y coordinate. Provide appropriate code for an instance of the class named as coord_ob to call all the member methods as follows:- coord_ob.getx().gety().dispcoordinate(). (5)

b) Write a complete program to create a class named as **Container** which contains an attribute of type double that could be used to calculate the volume of a container and a public pure virtual function named as volume(). Create two new classes named as **Sphere** and **Cube** from the above class. Implement dynamic polymorphism to find the volumes of a sphere and cube objects by redefining the volume() function. You can provide any other function to initialize the attribute and to display the volume. (5)

Q5 a) Perform the following operation within main():
a = b + c; where, a is an object of class A, b is an object of class B and c is an object of class C. Each of the class contains a private attribute of type int. Hint: overload the binary + operator. (5)

b) With an appropriate programming example explain the overloading of an array indexing operator. (5)

Q6 What is a copy constructor? State the two different signatures possible for any copy constructor. Why a constant reference parameter is preferred in a copy constructor? Explain, why deep copying is necessary, by taking an appropriate programming example. (10)

Student Id | | | | | | | |

No. of Pages: 03

B Tech

Third Semester (End Sem) Examination - Nov 2017

OBJECT ORIENTED PROGRAMMING USING C++ (CS103)

Branch: CS/IT/EEE/CE

Time: $2\frac{1}{2}$ Hours

Max Marks: 50

Answer any **Five** questions.

The figures in the right hand margin indicate marks.

Q1 a) Write a complete C++ program to implement the following: (5)

Define a class batsman with the following specifications:

Public members:

readdata(): Function to accept value from bcode, name, innings, notout and invoke the function calcavg()

displaydata(): Function to display the data members on the screen.

Private members:

bcode 4 digits code number

bname 20 characters

innings, notout, runs integer type

batavg is calculated according to the formula:

batavg =runs/(innings - notout)

calcavg() Function to compute batavg

b) Write a C++ program to create a class named as **Triangle** with three sides as its protected attributes. Provide a constructor to initialize these attributes. Provide a public member function named as check_and_display() which would check whether the triangle is a right angled triangle or not and makes a call to another member function named as area() which would be overloaded to find out the area of a right angled triangle or any other triangle and displays the value. (5)

Q2 A book shop maintains the inventory of books that are being sold at the shop list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book, the sales person inputs the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed. If it is, then the system displays the book details and requests for the number of copies required. If the requested copies are available the total cost of the required copies is displayed; otherwise the message "Required copies not in stock" is displayed. (10)

Design a system using a class books with suitable member functions and constructors. Use ***new*** operator in constructors to allocate memory space required

Q3 a) With an appropriate example explain the importance of a user defined copy constructor over default copy constructor (provided by the compiler). (Hint: Deep and shallow copying). (5)

b) Perform the following operation within main( ): a = b - c; Where, a is an object of class A, b is an object of class B and c is an object of class C. Each class has two private attributes of type double. (5

Q4 Design a class named Box whose dimensions are integers and private to the class. The dimensions are labeled: length l, breadth b, and height h. (10)

The default constructor of the class should initialize l, b, and h to 0.

The parameterized constructor Box(int length, int breadth, int height) should initialize Box's l, b, and h to length, breadth and height.

The copy constructor Box(Box B) should set l, b and h to B's l, b and h, respectively.

Apart from the above, the class should have 4 functions:

int getLength() - Returns box's length

int getBreadth() - Returns box's breadth

int getHeight() - Returns box's height

long long CalculateVolume() - Returns the volume of the box

Overload the operator < for the class Box. Box A < Box B if:

A.l < B.l

A.b < B.b and A.l == B.l

A.h < B.h and A.b == B.b and A.l == B.l

Overload operator << for the class Box().

If B is an object of class Box:

cout << B should print B.b, B.l and B.h on a single line separated by spaces.

Constraints

Two boxes being compared using the < operator will not have all three dimensions equal.

The following code would be a part of your entire C++ program and must execute correctly:

```
void check(){  Box temp;
               int choice;
               if(choice==1)   { cout<<temp<<endl;}
               if(choice==2)   { int l,b,h; cin>>l>>b>>h;
                                 Box  newBox(l,b,h);   temp=newBox; cout<<temp<<endl; }
               if(choice==3)   { int l,b,h; cin>>l>>b>>h;
                                 Box  newBox(l,b,h);
                                 If(temp < newBox) { cout<<"Lesser"<<endl;}
                                 else {cout<<"Greater"<<endl;} }
               if(choice==4)   { cout<<temp.CalculateVolume()<<endl; }
               if(choice==5)   { Box newBox(temp);  cout<<newBox<<endl; }  }
int main() { check(); return 0; }
```

Q5 a) Write a program that illustrates the application of multiple catch statements and which also uses catch(…) handler. (5)

b) Write a complete C++ program where a generic function can sort an array of elements in an ascending order. (5)

Q6 This problem is to get you familiar with virtual functions. Create three classes Person, Professor and Student. The class Person should have data members name and age along with two virtual functions named as getdata and putdata. The classes Professor and Student should inherit from the class Person. (10

The class Professor should have two integer members: publications and cur_id. There will be two member functions: getdata and putdata. The function getdata should get the input from the user: the name, age and publications of the professor.

The function putdata should print the name, age, publications and the cur_id of the professor.

The class Student should have two data members: marks, which is an array of size 5 and cur_id. It has two member functions: getdata and putdata. The function getdata should get the input from the user: the name, age, and the marks of the student in each subjects. The function putdata should print the name, age, sum of the marks and the cur_id of the student.

For each object being created of the Professor or the Student class, sequential id's should be assigned to them starting from 1.

Input Format

The first line of input contains the number of objects that are being created. If the first line of input for each object is 1, it means that the object being created is of the Professor class, you will have to input the name, age and publications of the professor.

If the first line of input for each object is 2, it means that the object is of the Student class, you will have to input the name, age and the marks of the student in each subjects.

If you want you can take any other data as per your requirement.

Constraints

$1 \leq$ lenname ≤ 100, where lenname is the length of the name and space is not allowed within a name.

$1 \leq$ age ≤ 80

$1 \leq$ publications ≤ 1000

$0 \leq$ marks ≤ 100, where marks is the marks of the student in each subject.

Output Format

There are two types of output depending on the object.

If the object is of type Professor, print the space separated name, age, publications and id on a new line.

If the object is of the Student class, print the space separated name, age, the sum of the marks in subjects and id on a new line.

Sample Input

```
4
1
Govind 56 99
2
Archana 18 50 48 97 76 34
2
Rahul 22 10 12 0 18 45
1
Murthy 58 87
```

Sample Output

```
Govind 56 99 1
Archana 18 305 1
Rahul 22 85 2
Murthy 58 87 2
```

Student Id | B | 5 | 1 | 7 | 0 | ? | 2 |

No. of Pages: 04

B.Tech.

Third Semester (End-Sem) Examination - November 2018

OBJECT ORIENTED PROGRAMMING USING C++ (CS103)

Branch: CE/CSE/IT/EEE

Time: $2\frac{1}{2}$ Hours

Max Marks: 50

Answer any **Five** questions.

The figures in the right hand margin indicate marks.

Q1 a) Write a program to create a class named **Circle** with three private member attributes **x, y** and **r**. The attributes **x** and **y** represent the center of a circle and **r** represents the radius of the same circle. Any circle object must be created by initializing **x, y** and **r** through a parameterized constructor by giving user input only. Provide a non-member function named **find_guess()** which will accept two arguments **p** and **q** supplied by a user along with any other parameter if required. The **find_guess()** function must do the following: (5)

(i) calculate the distance (= d) between the two points denoted by the coordinates (x, y) and (p, q),

(ii) compares d with r and,

(iii) displays "The supplied point is on the perimeter" if d = r or "The supplied point is not on the perimeter" if d ≠ r.

b) What are **static** member variables and functions? Write a suitable C++ program to illustrate the usage of **static** members. (5)

Q2 a) Write a complete C++ program to achieve the following: (5)

(i) Create an **abstract class** named **Point** with two protected attributes **x** and **y** which would represent the coordinates of a point,

(ii) Provide a public **pure virtual function** named **find_length()** without definition,

(iii) Inherit a class named **Line** from the class **Point** and the **find_length()** should be redefined to calculate and display the length of a line (remember to create a line you require two points), and

(iv) Inherit a class named **Triangle** from the class **Line** and the **find_length()** should be redefined to calculate and display the length of each side of a triangle (remember to create a triangle you require three points).

Your program must implement and exhibit **dynamic polymorphism**.

b) What is a **this** pointer? Write a program with a class having an integer member and write a member function to find the maximum between two objects using **this** pointer. (5

Q3 a) With an appropriate programming example explain **deep copying** and **shallow copying**. (5)

b) Define a class called **ComplexNumber** that holds the real and imaginary as its private members. Along with this, the class holds necessary parameterized constructor to give the initial values to its objects. Another member function named **display_complex()** is used to display a complex object as **x + iy** form. Exercise the main() function that perform **C3 = C1 – C2** and yield the subtracted complex number. **C1, C2,** and **C3** are objects of the class **ComplexNumber**. (5)

Q4 Design a class named **Box** whose dimensions are integers and private to the class. The dimensions are labeled: length **l**, breadth **b**, and height **h**. (10)

The default constructor of the class should initialize l, b, and h to 0.

The parameterized constructor **Box(int length, int breadth, int height)** should initialize Box's l, b, and h to length, breadth and height.

The copy constructor **Box(Box B)** should set l, b and h to B's l, b and h, respectively.

Apart from the above, the class should have 4 functions:

int getLength() - Returns box's length

int getBreadth() - Returns box's breadth

int getHeight() - Returns box's height

long long CalculateVolume() - Returns the volume of the box

Overload the operator < for the class Box. Box A < Box B if:

A.l < B.l

A.b < B.b and A.l == B.l

A.h < B.h and A.b == B.b and A.l == B.l

Overload operator << for the class Box().

If B is an object of class Box:

cout << B should print B.b, B.l and B.h on a single line separated by spaces.

Constraints

Two boxes being compared using the < operator will not have all three dimensions equal.

The following code would be a part of your entire C++ program and must execute correctly:

```
void check(){  Box temp;
               int choice;
               if(choice = = 1)   { cout<<temp<<endl;}
               if(choice = = 2)   { int l,b,h; cin>>l>>b>>h;
                                    Box  newBox(l,b,h);  temp=newBox; cout<<temp<<endl; }
               if(choice = = 3)   { int l,b,h; cin>>l>>b>>h;
                                    Box  newBox(l,b,h);
                                    if(temp < newBox) { cout<<"Lesser"<<endl;}
                                    else {cout<<"Greater"<<endl;} }
               if(choice = = 4)   { cout<<temp.CalculateVolume()<<endl; }
               if(choice = = 5)   { Box newBox(temp); cout<<newBox<<endl; }  }
int main() { check(); return 0; }
```

Q5 a) Let us assume a class named **Student** with two public member attributes as **stud_id** and **stud_marks**. The following constraints need to be followed for the stud id and stud marks attributes: **0 < stud_id ≤ 60** and **0 ≤ stud_marks ≤ 50.** (5)
Write a complete C++ program where for any particular object of the class Student when created the above mentioned constraints must be followed otherwise an appropriate exception handling mechanism must be invoked to tackle the exceptions. (Hint: Develop exception handling mechanism for objects of a class).

b) Write a complete C++ program where a **generic function** can **sort** an array of elements in ascending order. The inputs to the array and the size of the array should be given by the user. (5)

Q6 a) The IRCTC provides various services to its customers like booking a train ticket, displaying booking history, searching a train, etc. Let's say a customer is trying to check its booking history for a particular journey. For simplicity, the search is based on the following two criteria only: (5)

(i) Search by putting the PNR or
(ii) Search by putting the journey date in DD/MM/YYYY format.

Being a coder your task is to develop a function named as search_booking_history() using C++, that when invoked would display the details like:

(i) Train number,
(ii) Date (in DD/MM/YYY) and Time (in HH/MM) format,
(iii) Number of passengers,
(iv) Source station name, and
(v) Destination station name

Assume that a struct named as Ticket contains 100 number of ticket booking details in an array named as ticket_history. The different fields of struct Ticket as follows:

```
struct Ticket{
        unsigned int train_no, dd, mm, yyyy, no_passengers;
        string source_station, destination_station;   };

Ticket ticket_history[100];
```

b) Ankita is having a savings account in Global Bank of India. Below given table shows her transaction details over a period of time. Ankita also has an Internet banking account through which she can monitor her banking transactions. Presently the bank has an interface (function) named as **search_transaction()** which shows all the transaction details once it is invoked. More specifically, the **search_transaction()** shows all the transactions from the date of opening an account to the present date once it is invoked. Ankita feels that this function is not so user friendly as she wants to know transaction details as per her choices. Hence, she makes a request to the Global Bank of India to take care of this issue and specifies the following things need to be incorporated in the **search_transaction()**: (5

(i) The function should be able to produce all the transactions done in a particular year. For example if a user supplies a value 2017, then the function should be able to produce all the transactions done in the year 2017.

(ii) The function should be able to produce all the transactions done within a range of a year specified by starting month and ending month. For example, if a user specifies starting

month as 02 and ending month as 08 of 2017, then the function should be able to produce all the transactions taken place from 02/01/2017 to 08/31/2017.

Sample transaction details of Ankita

#	DD	MM	YYYY	Transaction Type	Amount in Rupees
1	01	01	2018	D	10000.00
2	02	02	2018	C	50000.00
3	14	02	2018	D	20000.00
4	02	03	2018	C	50000.00
5	18	03	2018	D	40000.00
6	02	04	2018	C	45000.00

To deal with this situation the Global Bank of India throws an open challenge to the budding coders and announces a winning amount of Rs. 100000/-. Being a good coder in C++, develop a proper C++ program to tackle the above problem. Assume that 1000 transaction details are available from Ankita's banking history and stored in an array of struct named as Transactions. Individual fields and their respective types in the struct Transactions are:

Field	Type
serial_no	unsigned int
DD	unsigned int
MM	unsigned int
YYYY	unsigned int
trans_type	char (either 'C' or 'D')
amount	long double