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BATCH → E-10

ASSIGNMENT NO - 01

Title → Classes and objects

Aim → Design a class 'complex' with data members for real & imaginary part. Provide default and parameterized constructors. Write a program to perform arithmetic operation of two complex numbers.

Objectives →

1) To learn concept of classes and objects.
2) Differentiate various programming paradigm.
3) Identify class, objects, methods and handle object creation, initialization to model real world problem.

Theory →

1) Class →

A class is user defined blueprint or prototype from which objects are created. It is collection of data members and functions (methods)
The data members can be made public or private.

Syntax →

```
class class_name {
    datatype data_members;
    class_name () {
    }
    methods
}
```

Example →

```
class Student {
  String name;
  int roll;
  void getdata () {
    System.out.println (name);
    System.out.println (roll_no);
  }
}
```

Explanation → A class is created whenever there is a collection of similar types of objects.

Features →

i) Polymorphism
ii) Methods
iii) Inheritance
iv) Encapsulation
v) Data Abstraction

2) Objects →

- Basic unit of object oriented programming.
- It represents real time entities.
- Every object has its own set of data members as soon as they are created.
- They are variables of the user defined datatype class.

Syntax → // declaration :
class-name object_name ;
// invoking constructor
object_name = new class-name (argument);

Example →

Student obj1 = new Student ();

Explanation → All the data-members are created for the object once the constructor is called using 'new' keyword.

Advantages →

The instances are created whenever reqd. and memory allocation is done only when user wants to.

3) Constructor →

- Constructor is a special method which is used to initialize the datamembers of class.
- It does not have any return type not even void and hence cannot return any value.

Syntax → class_name () { // default
}

class_name (args list) { // parameterised
}

Example →
```
Student (string n, int r) {
name = n;
roll_no = r; }
```

Explanation→ Constructor can be of two types:-
1) Default 2) Parameterized

When no constructor is defined, in-built constructor is called which initializes the numericals to '0' and strings to blank.

→ CLASS DIAGRAM→

Class COMPLEX
+ a : Float → Real Part + b : Float → Imaginary Part
+ Complex (int, int) + void add (complex, complex) + void sub (complex, complex) + void multiply (complex, complex) + void getdata (complex, complex)

Input →
Enter real & imaginary part
+1, -1
Enter real & imaginary part
+1, +1

Output →
1) Expected sum = 2.0 + 0.0i
Sum = 2.0 + 0.0i

2) Expected difference = 0.0 + (-2.0i)
Difference = 0.0 - 2.0i

3) Expected Product = 2.0 + 0.0i
Product = 2.0 + 0.0i

4) Expected quotient = 0.0 + 0.0i
Quotient = 0.0 + 0.0i