Practical Assignment – 3
B.C.A./B.Sc.I.T.
Semester – 4
Programming with Java
21BCACC402/21BITCC402
Assignment 3 – Inheritance & Package

1. Define a class **University** having instance variable **uname, ucity** and **tot_stud**. Define **getUni()** method to initialize instance variable. Define derived class **Department** having instance variable **deptno** and **deptname**. Define **getDept()** method to initialize instance variable. Also define **display()** method to display all information. Create two objects and demonstrate.

2. Define a class **University** having instance variable **uname, ucity** and **tot_stud**. Define **parameterized constructor** to initialize instance variable. Define derived class **Department** having instance variable **deptno** and **deptname**. Define **parameterized constructor** to initialize instance variable. Also define **display()** method to display all information. Create two objects and demonstrate.

3. WAP to perform mathematical operation create a class called **AddSub** with attributes num1 and num2 of type int, also define methods **calAdd( )** and **calSub( )** to calculate addition and subtraction .Create another class **MulDiv** that **extends AddSub** class to use member a data of super class. MulDiv should have methods **calMul( ) & calDiv( )** to calculate multiplication and division**.** A main method should access the methods and perform operations.

4. Create a Shape class as the abstract class with abstract method **draw( )**, its implementation is provided by the **Rectangle & Circle** classes. Create a reference of Shape class and if you create the instance of Rectangle class, draw() method of Rectangle class will be invoked. And same for Circle class. (Dynamic Method Dispatch)

5. Create two interfaces **Printable** and **Showable** having methods print( ) and show( ) respectively. Create a **Test_Multiple** class which implements all 2 interfaces and override print( ) and show( ) methods. Write a main method in this class and create an object of this class and use the methods.

6. Write a program that finds the length of the string "Java Programming". And also display a sub-string formed by the last five characters of the string. (use String class)

7. Create a package MathPack having class MathDemo with method add() and sub() to find addition and subtraction. Create another program and `import package and invoke methods.

8. Write a program to do the following using in-built methods in the string class of java.
    a. Find the 3rd character **in** the **string** "Atmiya University"
    b. Find the index of character 'o' **in string** "Java Programming".
    c. Convert the **string** "Enjoy Holiday" to uppercase.
    d. Replace character 'H' with 'n' **in** the string "Hello… Hi..".

Extra (Optional)

9. Declare a class called author having author_name as private data member. Extend author class to have two sub classes called book_publication & paper_publication. Each of these classes have private member called title. Show usage of dynamic method dispatch (dynamic polymorphism) to display book or paper publications of a given author. Use command line arguments for inputting data.

10. The abstract Vegetable class has three subclasses named Potato, Brinjal and Tomato. Write an application that demonstrates how to establish this class hierarchy. Declare one instance variable of type String that indicates the color of a vegetable. Create and display instances of these objects. Override the toString() method of Object to return a string with the name of the vegetable and its color.

11. Define class Human with first name and last name. Define new class Student which is derived from Human and has new field – grade. Define class Worker derived from Human with new field weekSalary and work-hours per day and method MoneyPerHour() that returns money earned by hour by the worker. Define the proper constructors and properties for this hierarchy. Create object and demonstrate.

12. Write a java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.

13. Create a base class Fruit which has name ,taste and size as its attributes. A method called eat() is created which describes the name of the fruit and its taste. Inherit the same in 2 other class Apple and Orange and override the eat() method to represent each fruit taste.

14. Write a Java program to create a vehicle class hierarchy. The base class should be Vehicle, with subclasses Truck, Car and Motorcycle. Each subclass should have properties such as make, model, year, and fuel type. Implement methods for calculating fuel efficiency, distance traveled, and maximum speed.

15. Perform following operation on string "Java is simple language."

    - print the string

- find the length of the string
- convert string into uppercase
- convert string into lowercase
- find the index of character 's'
- replace character 'a' with 'b'
- replace "is" with "was"
- Find substring from index no 15
- Find substring from index no 15 to 18.
- Check whether string starts with "J" or not.
- Check whether string ends with "j" or not.