Bharatiya Vidya Bhavan's
Sardar Patel Institute of Technology
(Autonomous Institute Affiliated to Mumbai University)
[Knowledge is Nectar]

ACADEMIC YEAR 2023-24

Class: F.Y. B. Tech. Semester: II Course: PSOOP(Java)

Course In charge: Nikahat Mulla

_____ List of Problems for practice-Set IV-Runtime Polymorphism

1. Create class Person with attributes phone_number, name and a method read()for getting and setting the name and phone_number. Include a method show() to display the phone_number and name.
   Derive class Student from person with attributes roll_number ,course and method read to override that in base class person. In this read() method give a call to the base class read() and ask for setting roll_number and course. Here also include a method show() which initially calls the base class method show() and then displays the roll_number and course.
   Write a Main class which demonstrates runtime polymorphism

2. Create a base class called Shape.Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called Triangle and Rectangle from the base Shape. Add to the base class, a member function get_data() to initialize base class data members and another member function display_area() both as virtual functions and redefine these functions in the derived classes to suit the requirements.
   Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively, and display the area.
   Remember the two values are given as input will be treated as lengths of two sides in the case of rectangles and as base and height in the case of triangles and used as follows: Area of rectangle = x*y
   Area of triangle = ½ *x*y
   In main, create a base class pointer and point it to the appropriate derived class objects to demonstrate runtime polymorphism.

3. Consider a class called Car with data car_no and producer (both private). Write appropriate constructos and setter/getter methods. Add a method called display(). Derive two classes PassCar and Truck from Car. PassCar has private data passCarType and sunRoof(boolean). Add appropriate constructors and

setter/getter methods. Override method display(). Class Truck has data members numberAxles, loadCapacity(private). Add constructors and setter/getter methods. Override method display().
Assume a car rental company which has two types of cars. Write a main class in which you would create an array of Cars (Parent type). Ask the user which type of car he wants and
appropriately assign each car reference to the appropriate object (truck/passcar). Call the display method once the object is assigned clearly demonstrating runtime polymorphism.

4. Design a class hierarchy consisting of Publication , Magazine , Book , and KidsMagazine classes as follows: A Publication has a publisher, number of pages, a price, and a title. The class should implement a print method that displays all of this information. A Magazine is a kind of publication that has a publication unit (monthly, weekly, biweekly). Magazine should override the print method of Publication and display all the new information. A Book is a kind of publication that has an author. Book should also override the print method of Publication . A KidsMagazine is a kind of magazine that has a recommended age range. Again, KidsMagazine should override the print method of Publication.
Implement a test class that stores 10 different types of publications: general, magazine, book, or kid's magazine in an array of Publication . Exploit polymorphism and print the information, sorted by title, about each object stored in the array.