

**Jaypee University of Engineering and Technology, Guna**  
**Department of Computer Science and Engineering**  
**Object Oriented Programming Lab (18B17CI271)**

**Lab Exercise-6**

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**[Imp Note: All the programs must be written in C++ with distinguished variable names. If any kind of plagiarism is observed, the punctuality marks (10) will be awarded by zero.]**

1. Create two classes polar and rectangle. Polar class has two data members radius and angle and rectangle has two data members x and y. Write constructors and member functions to get input from user and display the data members in both the classes. Write a program using the concept of type conversion to convert an object of class polar to object of rectangle and vice versa. Also write a function which computes distance between two points represented either in polar or rectangular coordinates.

Hint: formulas to convert **polar** coordinates to **rectangular** coordinates:

$$x = r \cos q, \quad y = r \sin q$$

formulas to convert **rectangular** coordinates to **polar** coordinates:

$$r = \sqrt{x^2 + y^2}, \quad q = \tan^{-1}(y/x)$$

2. Design a class Distance that includes following data members: feet, inches. It has the following member function:-
  - Constructor, that initializes the distance to 0,0 by default.
  - Give a check so that the inches part is always less than 12.0.
  - Display function
  - Overloaded – operator to subtract 2 distances
  - Overloaded + operator to add 2 distances
  - Overload += and -= operator
  - Overload > and < operators to compare two distances
3. Create a class rational for performing arithmetic with fractions. Use an integer variable to represent the private data of the class-the numerator and denominator. Provide a member function to get input from the user. This function should also check that denominator entered is not 0, if it is zero print invalid input. Provide a function to display the values. Overload +, -, \*, / operators to add, subtract, multiply and divide the objects of this class.
4. Include a function that adds two strings to make a third string. Write a program to do the following tasks:
  - i. Create uninitialized string objects
  - ii. Creates the objects with string constants.
  - iii. Concatenates two strings properly.

iv. Displays a desired string object