OBJECT ORIENTED PROGRAMMING

SECTION – C [WEDNESDAY SEPTEMBER 08, 2021: 2:00 PM – 5:30 PM]

ASSIGNMENTS – 04 (RP04) CODE: ASSIGN04

NOTES:

i) Create files with the following file naming conventions: If your roll number ends with **abc**, year of admission is 20**19** and assignment code is **Assign04** then, use the file name as follows: Assign042019abc.cpp (OR) Assign042019abc.java (use appropriate extensions like .cpp or .java suitably). For example, if the roll number ends with 172; year of admission is 2019 & the assignment code is Assign04, then the file name should be **Assign042019172.cpp** (OR) **Assign042019172.java**

ii) Strictly follow the file naming convention. Otherwise, it would attract a penalty upto 20%.

PROBLEMS [Total Marks: 20]

Note: Use random number generator to generate inputs wherever needed.
You could choose either C++ (.cpp) or JAVA (.java) to solve these problems.

Define a public class with the same name as suggested above for the file name.

1) **[Marks: 20]**

Define classes as: `Line` and `Square` and `Rectangle` with the following attributes:

`Point`: *x*, *y*: float - two end points;
`Line` : *a*, *b*: Point - two end points; lineWidth: int (1-2); lineColor: int (5 colors)
`Square`: *p*, *q*, *r*, *s*: four line segments; *l*: length of the sides;
`Rectangle`: *p*, *q*, *r*, *s*: four line segments; *l*: length, *w*: breadth (width)

Write methods to perform various tasks:

a) [4 marks] Randomly generate end points of a line segment in the grid [0, 0] - [50,50]; Write a method to print the end points of the line segment and the length of the line segment.

b) [4 marks] Write a method to do the following:
   i. Randomly generate 4 points.
   ii. Check whether these four points could form a square or rectangle.

   This method should return true, if the resulting object is either square or rectangle

c) [4 marks] Write a method to convert the generated shape (created using 4 random points) into either a Square or a Rectangle

d) [4 marks] Write two methods in the `Rectangle` class to return (a) the perimeter of a rectangle (takes two arguments) and (b) the area of a rectangle (takes two arguments)

e) [4 marks] Use the above two methods to find and print the area and perimeter of the square whose side is of length k:

```
void findAreaSquare(int k);
void findPerimeterSquare(int k);
```