DATA STRUCTURES

BATCH – B
[THURSDAY FEBRUARY 16, 2017: 2:00 PM – 5:00 PM]

ASSIGNMENTS – 5   CODE: assign05

INSTRUCTIONS: [Total Marks: 20]

  i)   Read all assignments and each problem has to be answered in the same c file.
  ii) Create a .c file following the file name convention: abc-assign05.c
       Where abc is your roll number and assign05 is the assignment code
  iii) Strictly follow the file name convention and do not use scanf()

PROBLEMS:
  1) **[Marks: 3 marks]**
     Define a CIRCLE using typedef with center, radius and area.

  2) **[Marks: 17 marks]**

     Using the following prototypes, write functions for the following tasks:

     a) **[Marks: 3 marks]**
         Generate n circles by randomly generating a center (x, y) in [8.0, 8.0] and
         [20.0, 20.0] and radius in [2.0, 6.0]
         Use srand() function with time to initialize the random number generator.

         CIRCLE *genCircles(int n);

     b) **[Marks: 2 marks]**
        Compute the area of each of n circles

        void findArea(CIRCLE *c, int n);

     c) **[Marks: 2 marks]**
        Write a function to print the circles (center, radius and area of each circle)

        void printCircles(CIRCLE *c, int n);

     d) **[Marks: 5 marks]**
        Write a function that finds the number of overlaps of each of n CIRCLEs
        and prints the count (you do not need to store them in the structure …
        Simple print the output)

        void findOverlapCounts(CIRCLE *c, int n);

     e) **[Marks: 5 marks]**
        *A pair of points defines a line segment. A line segment becomes tangent to
        a circle if it intersects the circle at only one point.*

        Write a function to find 2 non-parallel tangents, whose end points should
        be in the interval [1.0, 25.0], for each of n CIRCLEs and print the
        coordinates of these 2 tangents (Simply print a pair of points as the output)

        void findTwoTangents (CIRCLE *c, int n);