April 16, 2021 End-Semester examination

Indian Institute of Technology Guwahati

Computer Science & Engineering

CS 502 Computational Geometry

Give brief and to the point answers.
Use figures to explain.
Answer all questions.

No of Questions: 5 *Maximum Time: 2 Hours*
Maximum Marks: 50

1. [10 Marks] Given a set $P = \{p_1, p_2, \ldots, p_n\}$ of n points in a plane, design an algorithm to preprocess P such that, given query point q is in P or not can be determined efficiently.

2. [10 Marks] Design an efficient algorithm to determine whether give query point lies in a 3D convex hull or not.

3. [10 Marks] Given a set I of n intervals on the real line, efficiently determine those intervals that contain a given query interval $[x : x']$.

4. [10 Marks] Let S be a set of n segments in the plane. A line that intersects all segments of S is called a transversal or stabber for S. Design an efficient algorithm to decide if a stabber exists for S.

5. [10 Marks] Design a liner line sweepline algorithm to determine the intersection of two convex hulls in 2D.