



- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.

1. a) Discuss two fields of applications of computational geometry highlighting why classical geometry can't be applied in such field. **8**
- b) What is convex hulls? Discuss orientation and limitation of convex hull in detail. **6**

OR

2. a) Explain line segment intersection in light of computational geometry. **8**
- b) Give an example of a doubly-connected edge list where for an edge e the faces Incidentface (\vec{e}) and Incidentface (Twin(\vec{e})) are same. **6**
3. a) Prove that any polygon admits triangulation, even if it has holes. Can you say anything about the number of triangles in the triangulation? **7**
- b) Give the applications of algorithm for intersection of half plane. **6**

OR

4. a) Write and explain divide and conquer based algorithm for intersection of n half – planes. **10**
- b) Let P be a simple polygon with n vertices, which has been partitioned into monotone pieces. Prove that the sum of the number of vertices of the pieces is $O(n)$. **3**
5. a) Describe algorithm to insert and delete points from a kd – tree. In your algorithm you do not need to take care of rebalancing the structure. **7**
- b) Write randomize incremental algorithm to construct trapezoidal map. **6**

OR

6. a) Draw a graph of the search structure D for the set of segments shown in fig Q. 6 a, for some insertion order of the segment. 8

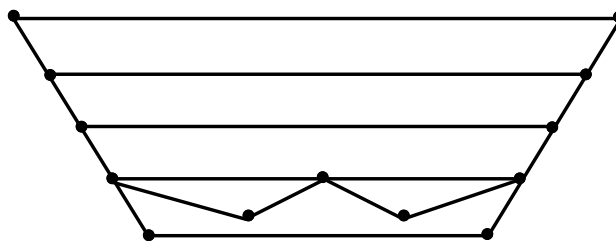


Fig. Q.6 (a)

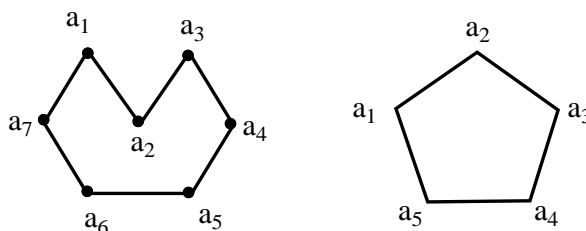
- b) Explain use of 1-Dimensional range searching. 5
7. a) What is voronoi diagram? How it is need to determine whether the new branch of super market will attract customers or not. 7
- b) What is visibility? Discuss algorithms for weak and strong visibility. 6

OR

8. a) Prove that for any $n > 3$ there is a set of n point sites in the plane such that one of the cells of Vor (P) has $n - 1$ vertices. 6
- b) Describe Voronoi diagram. What do you understand by duality of voronoi diagram. 7
9. a) The degree of a point in a triangulation is the number of edges incident to it. Give an example of n points in the plane such that, no matter how the set is triangulated, there is always a point whose degree is $n - 1$. 8
- b) Describe angular triangulation and its application. 5

OR

10. a) Explain priority search trees. What is it's advantage over range trees. 7
- b) Discuss in brief, one dimentional range searching problem. Explain how this can be extended to multidimensional range searching. 6
11. a) Define convex hull. Determine convex hull, if any for the following figures. 8



Justify your solution.

- b) Discuss in brief any two applications of convex hull. 6
- OR**
12. a) Define binary space partition trees. Write an algorithm to construct BSP trees. 8
- b) Prove that if (some part of) an object A is scan – converted before (some part of) an object B is scan converted, then A can not lie in front of B. 6
