Graph Theory and Algorithms
Tutorial Sheet- 3

(1) Prove or disprove:
(i) Join of two bipartite graphs is a bipartite graph.
(ii) Corona of two bipartite graphs is a bipartite graph.
(iii) Cartesian product of two bipartite graphs is a bipartite graph.

(2) For which bipartite graphs G_1 and G_2, $G_1 \vee G_2$ is a bipartite graph.

(3) For which bipartite graphs G_1 and G_2, $G_1 \circ G_2$ is a bipartite graph.

(4) Find the total number of vertices, edges, degree of regularity, radius, diameter and girth of the n-dimensional hypercube Q_n.

(5) Let G_n be a simple graph whose vertex set is the set of all n-tuples of 0's and 1's, and where two vertices are adjacent if they differ exactly in one co-ordinate position. Prove that G_n is isomorphic to Q_n.

(6) Prove that the n-dimensional hypercube Q_n is a bipartite graph.

(7) Prove that every pair of non-adjacent vertices in Q_n have either exactly two common neighbors or no common neighbors at all.