1. Define Links, Diameter and Bisection for a given network topology. What are the values of these parameters for Ring and 2D Torus. How we can map logical and physical view from ring to 2d torus and vice versa. Also define congestion and what will be the value of congestion if we go from a logical schema of a Tauras to a physical Schema of Ring.   6 marks

2. Draw and Write broad level function for these.   6 marks
   a) All-to-one Reduce and One-to-all Braodcast
   b) Scatter and Gather
   c) All-gather and reduce-scatter

3. Parallel Quick sort is an important algorithm, which becomes basis for many other applications. Describe Parallel Quick sort along with its algorithm. What are the foundation concepts that helps to achieve parallel Quick sort.   4 marks

4. Parallel list ranker is basic ingredient for many HPC algorithms. Take appropriate example to illustrate the working of parallel list ranker.
                                                                        4 marks