

Q5) a) What is maximum number  $k$  such that if road repairs are done at some time to any  $k$  roads, then it is still possible to travel?

Ans The minimum spanning tree of the graph will give us the minimum number of edges such that we can go from every vertex to every other vertex in the graph, i.e. the graph will remain connected.

The minimum spanning tree can be denoted by  $M = \text{MSP}(G)$  and maximum  $k$  can be denoted by

$$k = \lambda(G) - 1 = 3 - 1 = 2 \quad \lambda: \text{Edge Connectivity}$$

b) When dealing with the intersection, we will compute cut-vertices and in (a) we computed the no. of bridges in the graph.

The cut vertices are denoted by

$$\# \text{ cut vertices} = \kappa(G) = 2 \quad \kappa: \text{Vertex Connectivity}$$

Over  $k$  intersections will be all vertices except for the cut vertices and another vertex for travelling

$$k = \kappa(G) - 1 = 2 - 1 = 1$$