**Exercises:**

**Q1:** Find all cycles in the graph shown below:



**Q2:** Consider The graph shown in figure, find all paths from vertex $A$ to vertex $R$. Also, indicate their lengths.



**Q3:** In each of the following graphs, find paths of length 9 and 11, and cycle of length 5, 6, 8 and p if possible.



**Q4:** The terminal vertices of a path are of degree ……………………….. .

**Exercises:**

**Q1:** Determine the cut vertices and bridges of the following graph:



**Q2:** Construct two non-isomorphic trees having exactly 4 pendant vertices on 6 vertices.

**Q3:** Find minimal spanning tree of the following graph $G$, where



**Exercise:**

Q1: Find the connectivity and edge connectivity of the following graphs:



Q2: Consider the graph $G$ shown below. Determine

1. All vertex- disjoint $x-y$ paths joining the vertices $x$ and $y$.
2. All edge-disjoint $x-y$ paths joining the vertices $x$ and $y$.



Q3: Among all graphs with $p$ vertices and $q$ edges, the maximum connectivity $κ(G)$ is zero when $q<p-1$ and is $\left⌊\frac{2q}{p}\right⌋$ when $q\geq p-1$.

**Excercies:**

**Q1:** Are the following graphs Eulerian? Does there exists an Eulerian open trail?



**Q2:** Determine if each statements is true or false. If true, provide a brief proof. If false, find a counter example.

1. Any graph in which all vertices have even degree contains an Eulerian trail.
2. A closed walk contains a cycle.

**Q3:** Which of the following graphs are Hamiltonian?



**Q4:** For what integers $m$ and $n$ is $K\_{m,n}$ Hamiltonian.