**Question 1:**

To determine the minimum spanning tree (MST) of the given graph using Prim's algorithm, follow these steps:

1. \*\*Initialization\*\*: Start with any vertex (let's start with vertex 1) and mark it as part of the MST.

2. \*\*Edge Selection\*\*: Select the edge with the smallest weight that connects a vertex in the MST to a vertex outside the MST.

3. \*\*Incorporate Vertex\*\*: Add the selected edge and the vertex it connects to the MST.

4. \*\*Repeat\*\*: Repeat the process until all vertices are included in the MST.

Let's go through the process step-by-step:

1. \*\*Start with vertex 1\*\*:

- Edges available: (1-2, weight 4), (1-6, weight 5), (1-3, weight 3)

- Select edge (1-3) with weight 3

- MST: (1-3), total weight = 3

2. \*\*Add vertex 3\*\*:

- Edges available: (3-2, weight 3), (3-4, weight 2), (1-2, weight 4), (1-6, weight 5)

- Select edge (3-4) with weight 2

- MST: (1-3), (3-4), total weight = 3 + 2 = 5

3. \*\*Add vertex 4\*\*:

- Edges available: (4-5, weight 3), (3-2, weight 3), (1-2, weight 4), (1-6, weight 5)

- Select edge (4-5) with weight 3

- MST: (1-3), (3-4), (4-5), total weight = 5 + 3 = 8

4. \*\*Add vertex 5\*\*:

- Edges available: (5-6, weight 1), (3-2, weight 3), (1-2, weight 4), (1-6, weight 5)

- Select edge (5-6) with weight 1

- MST: (1-3), (3-4), (4-5), (5-6), total weight = 8 + 1 = 9

5. \*\*Add vertex 6\*\*:

- Edges available: (3-2, weight 3), (1-2, weight 4)

- Select edge (3-2) with weight 3

- MST: (1-3), (3-4), (4-5), (5-6), (3-2), total weight = 9 + 3 = 12

All vertices are now included, and the edges in the MST are (1-3), (3-4), (4-5), (5-6), and (3-2) with a total weight of 12.

Answer: 12

**Question 4:**