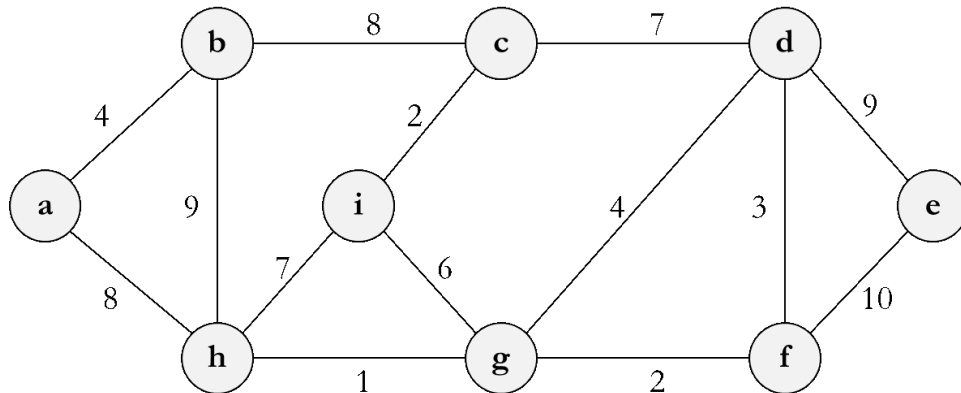


2. Find a minimum spanning tree for the following graph. You can use either Prim's or Kruskal's algorithm. Show the steps taken by your algorithm in finding the MST.



Explanation:

1. Prim's algorithm begins by creating an empty list of the visited nodes. It picks an arbitrary node to start out on. In this case it picked node A. **Visited = {A}**.
2. Since Prim's is a greedy algorithm, it will pick the shortest path to an unvisited node from an already visited node (one that is in the visited set). In this step, it will pick to go to node B since it's the shortest available path ($A \rightarrow B = 4$, $A \rightarrow H = 8$). **Visited = {A, B}**.
3. Now, it has 2 options since both the lowest available paths are equal ($A \rightarrow H = 8$, $B \rightarrow C = 8$). It will arbitrarily pick node H in this step. **Visited = {A, B, H}**.
4. The next smallest path to an unvisited node is node G ($H \rightarrow G = 1$). **Visited = {A, B, H, G}**.
5. The next smallest path to an unvisited node is node F ($G \rightarrow F = 2$). **Visited = {A, B, H, G, F}**.
6. The next smallest path to an unvisited node is node D ($F \rightarrow D = 3$). **Visited = {A, B, H, G, F, D}**.
7. The next smallest path to an unvisited node is node I ($G \rightarrow I = 6$). **Visited = {A, B, H, G, F, D, I}**.
8. The next smallest path to an unvisited node is node C ($I \rightarrow C = 2$). **Visited = {A, B, H, G, F, D, I, C}**.
9. The next smallest path to an unvisited node is node E ($D \rightarrow E = 9$). **Visited = {A, B, H, G, F, D, I, C, E}**.

The resulting MST has a total size of 35: $A \rightarrow B = 4$, $A \rightarrow H = 8$, $H \rightarrow G = 1$, $G \rightarrow F = 2$, $F \rightarrow D = 3$, $G \rightarrow I = 6$, $D \rightarrow E = 9$ ($4 + 8 + 1 + 2 + 3 + 6 + 2 + 9 = 35$).

In step 3 if the path $A \rightarrow B$ was chosen instead of $A \rightarrow H$, the MST would be: $A \rightarrow B = 4$, $B \rightarrow C = 8$, $C \rightarrow I = 2$, $I \rightarrow G = 6$, $G \rightarrow H = 1$, $G \rightarrow F = 2$, $F \rightarrow D = 3$, $D \rightarrow E = 9$ ($4 + 8 + 2 + 6 + 1 + 2 + 3 + 9 = 35$).