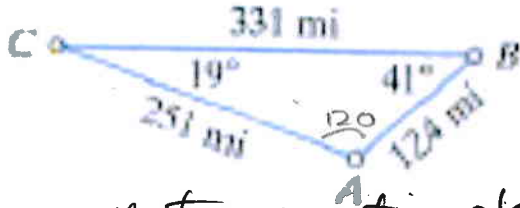
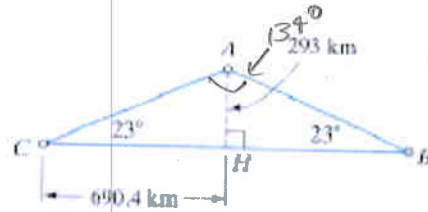


1. Determine if the graphs below will use native junctions to obtain the shortest network, or if it will require the construction of a Steiner junction. (You do not need to find the Steiner point, just say if it is necessary or not.)

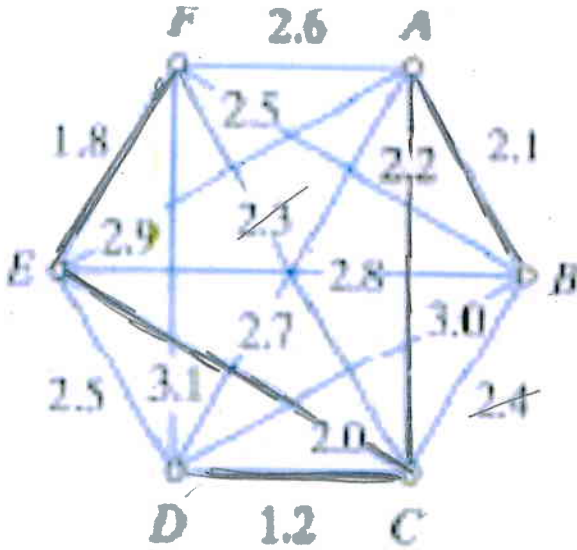


a. native junction ok  
AC + AB shortest network



b. native junction ok  
AC + AB shortest network

2. Use Kruskal's algorithm to find the minimal spanning tree for the graph below. Give the weight of the tree.

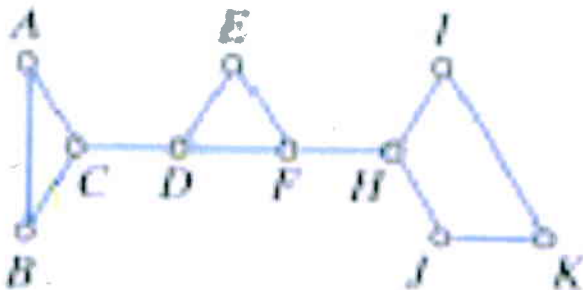


$$1.2 + 1.8 + 2.0 + 2.1 + 2.2 =$$

$$9.3$$

6 vertices, 5 edges

3. Consider the graph below. How many edges would need to be removed to obtain a tree? (This number is called the redundancy. Such redundancy is useful in real-world networks in case part of the network fails.)



3