6.

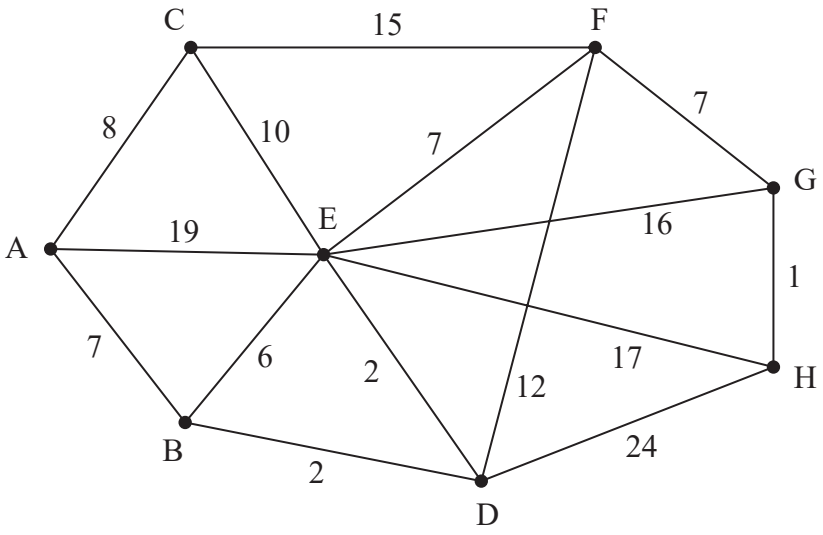


Figure 5

Figure 5 models a network of roads. The number on each edge gives the length, in km, of the corresponding road. The vertices, A, B, C, D, E, F, G and H, represent eight towns. Bronwen needs to visit each town. She will start and finish at A and wishes to minimise the total distance travelled.

(a) By applying Dijkstra's algorithm, starting at A, complete the table of least distances in the answer book.

(6)

(b) Starting at A, use the nearest neighbour algorithm to find an upper bound for the length of Bronwen's route. Write down the route that gives this upper bound.

(2)

A reduced network is formed by deleting A and all arcs that are directly joined to A.

(c) (i) Use Prim's algorithm, starting at C, to construct a minimum spanning tree for the reduced network. You must clearly state the order in which you select the arcs of your tree.

(ii) Hence, calculate a lower bound for the length of Bronwen's route.

(4)

(d) Using only the results from (b) and (c), write down the smallest interval that you can be confident contains the length of Bronwen's optimal route.

(2)

(Total 14 marks)