4.

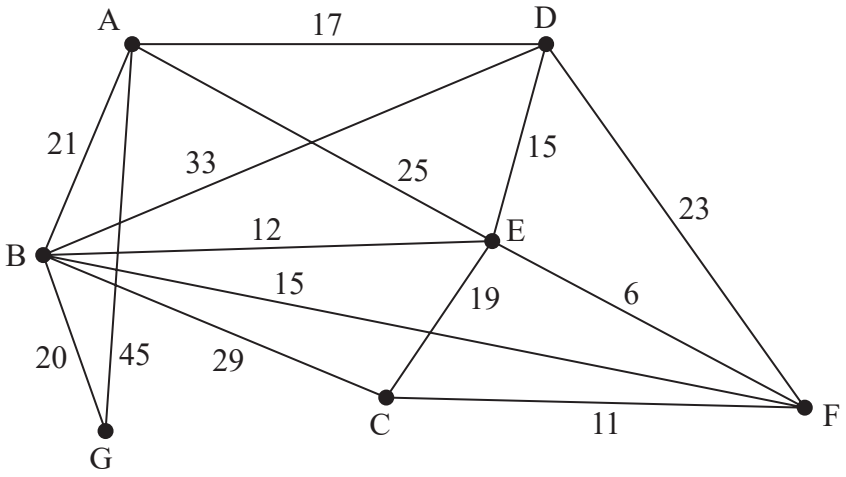


Figure 3

[*The total weight of the network is* 291]

Figure 3 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 and G, represent seven towns. Derek needs to visit each town. He will start and finish at A and wishes to minimise the total distance travelled.

(a) By inspection, complete the two copies of the table of least distances in the answer book.

(2)

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

(2)

(c) Interpret the route found in (b) in terms of the towns actually visited.

(1)

(d) Starting by deleting A and all of its arcs, find a lower bound for the route length.

(3)

Clive needs to travel along the roads to check that they are in good repair. He wishes to minimise the total distance travelled and must start at A and finish at G.

(e) By considering the pairings of all relevant nodes, find the length of Clive's route. State the edges that need to be traversed twice. You must make your method and working clear.

(5)

(Total 13 marks)