

QQQ – Decision 1 – Chapter 4 – Route Inspection (Version 2)

Total Marks: 21

(21 = Platinum, 19 = Gold, 17 = Silver, 14 = Bronze)

1.

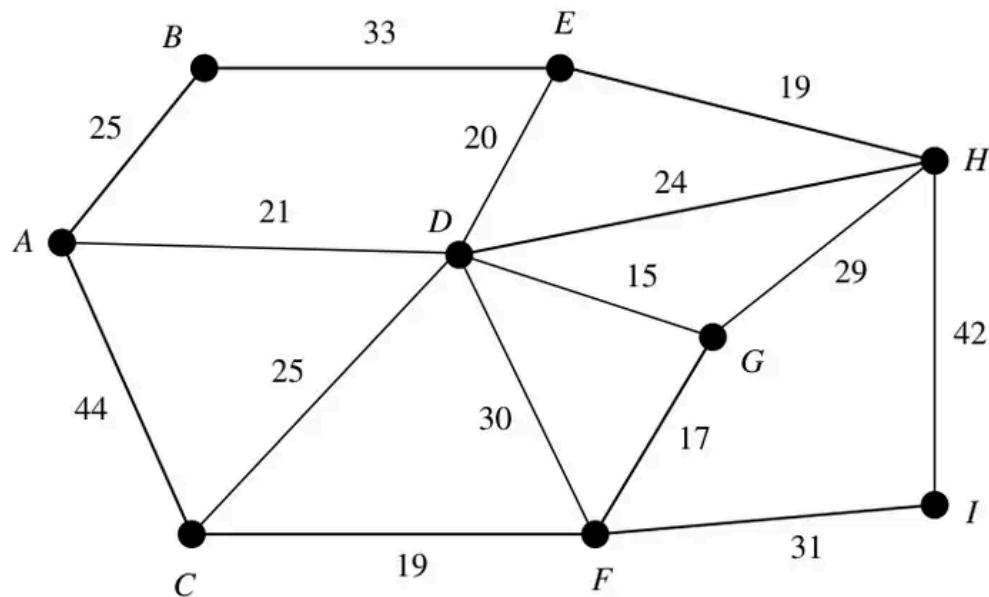


Figure 2

Figure 2 shows the network of pipes represented by arcs. The length of each pipe, in kilometres, is shown by the number on each arc. The network is to be inspected for leakages, using the shortest route and starting and finishing at A.

- (a) Use the route inspection algorithm to find which arcs, if any, need to be traversed twice. (4)
- (b) State the length of the minimum route. [The total **weight** of the network is 394 km.] (1)

It is now permitted to start and finish the inspection at two distinct vertices.

- (c) State, with a reason, which two vertices should be chosen to minimise the length of the **new** route. (2)

(Total 7 marks)

2.

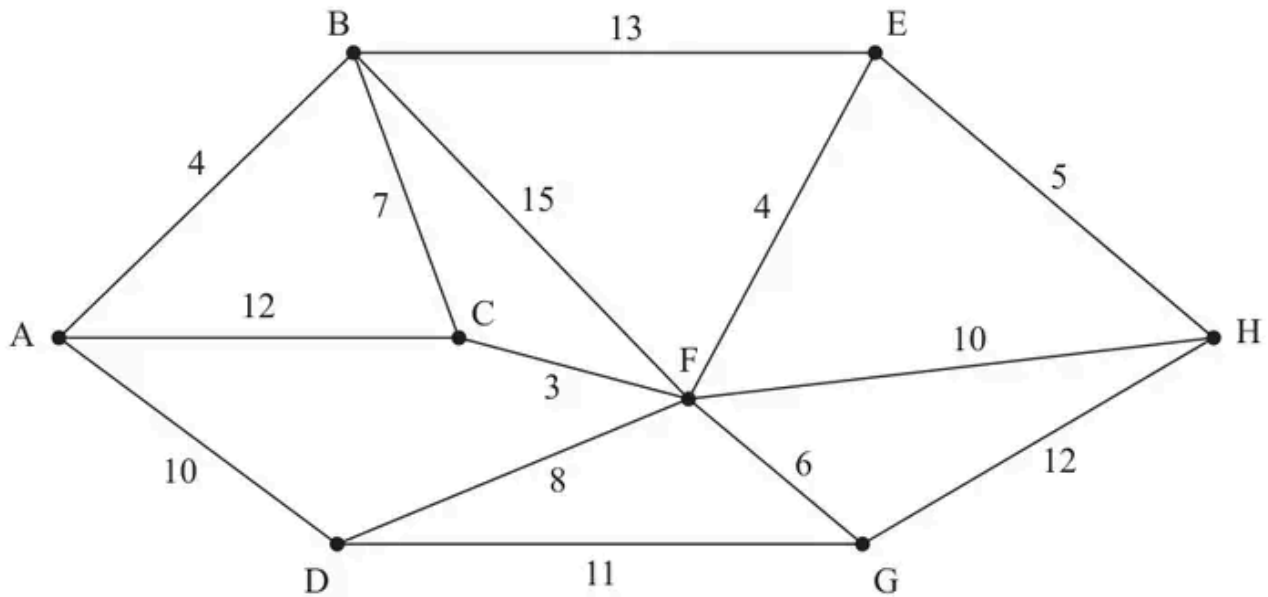


Figure 2

[The total weight of the network is 120]

(a) Explain what is meant by the term “path”. (2)

(b) State, with a reason, whether the network in Figure 2 is Eulerian, semi-Eulerian or neither. (1)

Figure 2 represents a network of cycle tracks between eight villages, A, B, C, D, E, F, G and H. The number on each arc represents the length, in km, of the corresponding track. Samira lives in village A, and wishes to visit her friend, Daisy, who lives in village H.

(c) Use Dijkstra’s algorithm to find the shortest path that Samira can take. (5)

An extra cycle track of length 9 km is to be added to the network. It will either go directly between C and D or directly between E and G.

Daisy plans to cycle along every track in the new network, starting and finishing at H.

Given that the addition of either track CD or track EG will not affect the final values obtained in (c),

(d) use a suitable algorithm to find out which of the two possible extra tracks will give Daisy the shortest route, making your method and working clear. You must

- state which tracks Daisy will repeat in her route
- state the total length of her route

(6)

(Total 14 marks)

Edexcel AS June 2022 Q3