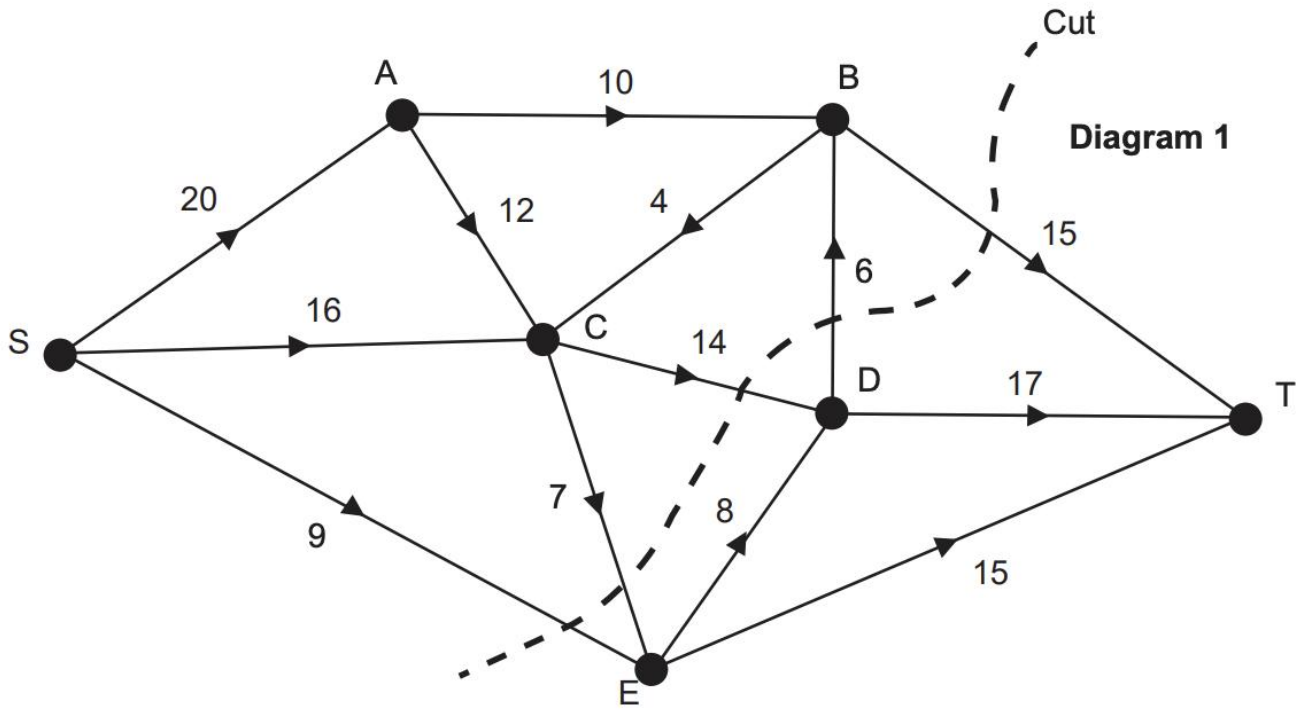
Question 16 **(10 marks)**

The graph below shows a network of water pipes. The water source and main pumping station are located at S. The distribution centre is at T and the other vertices are intermediate pumping stations. The weights on the edges show the capacities in kilolitres per hour that can flow through each pipe.



(a) (i) Determine the value of the cut shown in **Diagram 1**. (1 mark)

(ii) Using your answer to part (a)(i), what can be said about the maximum flow of water through the network? (1 mark)

(b) State the maximum possible flows along the paths SABT and SCDT. (2 marks)

(c) Determine the maximum flow from S to T, listing each path and the corresponding flow.

(3 marks)

(d) Using **Diagram 2** below, indicate a possible flow along each pipe corresponding to the maximum flow calculated in part (c). (2 marks)

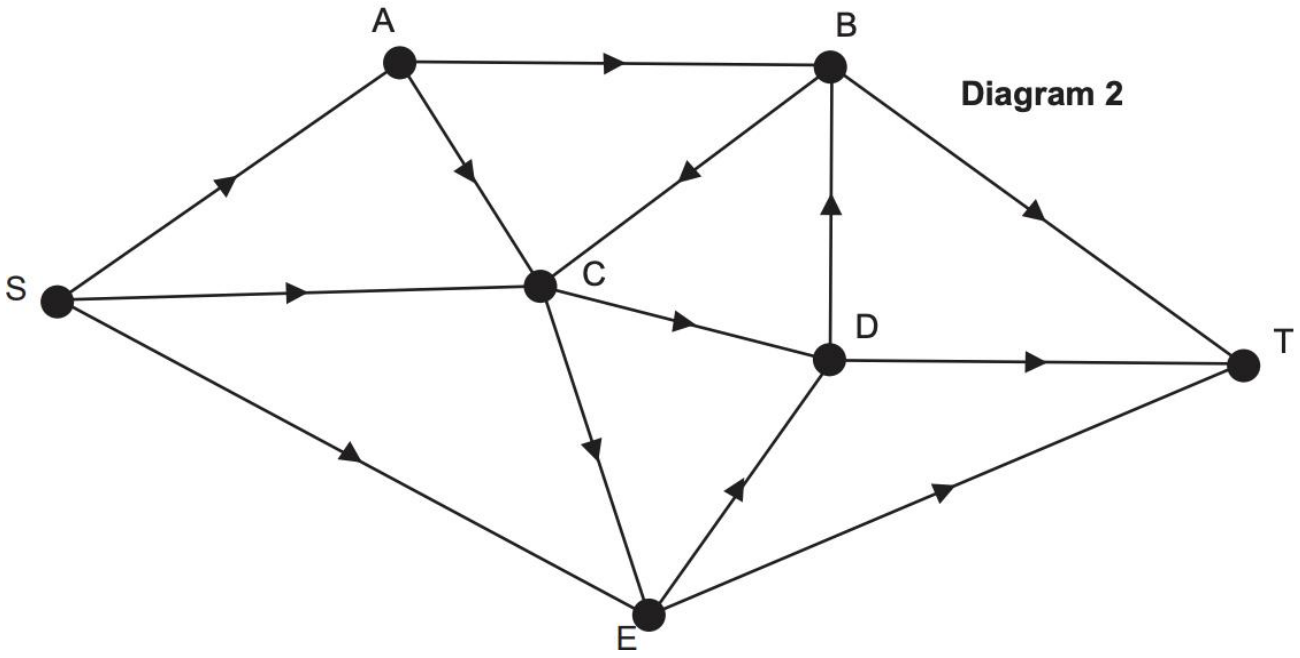


Diagram 2

(e) Determine the minimum cut that corresponds to the maximum flow and illustrate this on the copy of **Diagram 1** shown below. (1 mark)

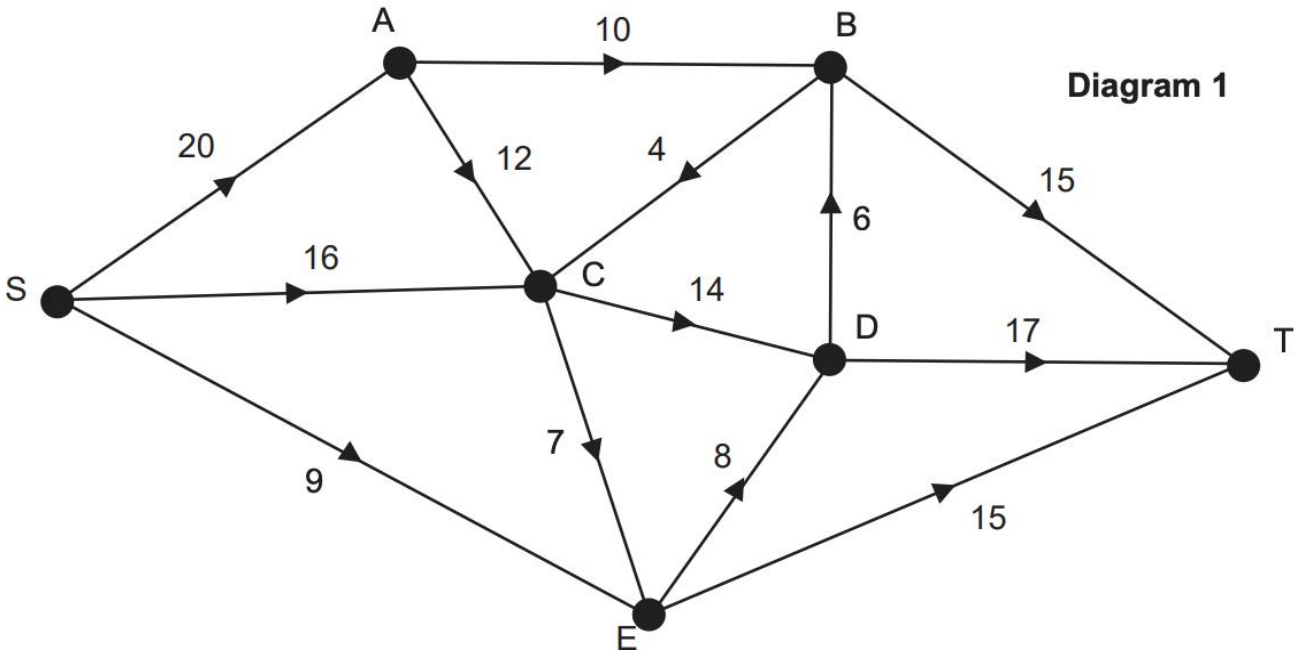


Diagram 1