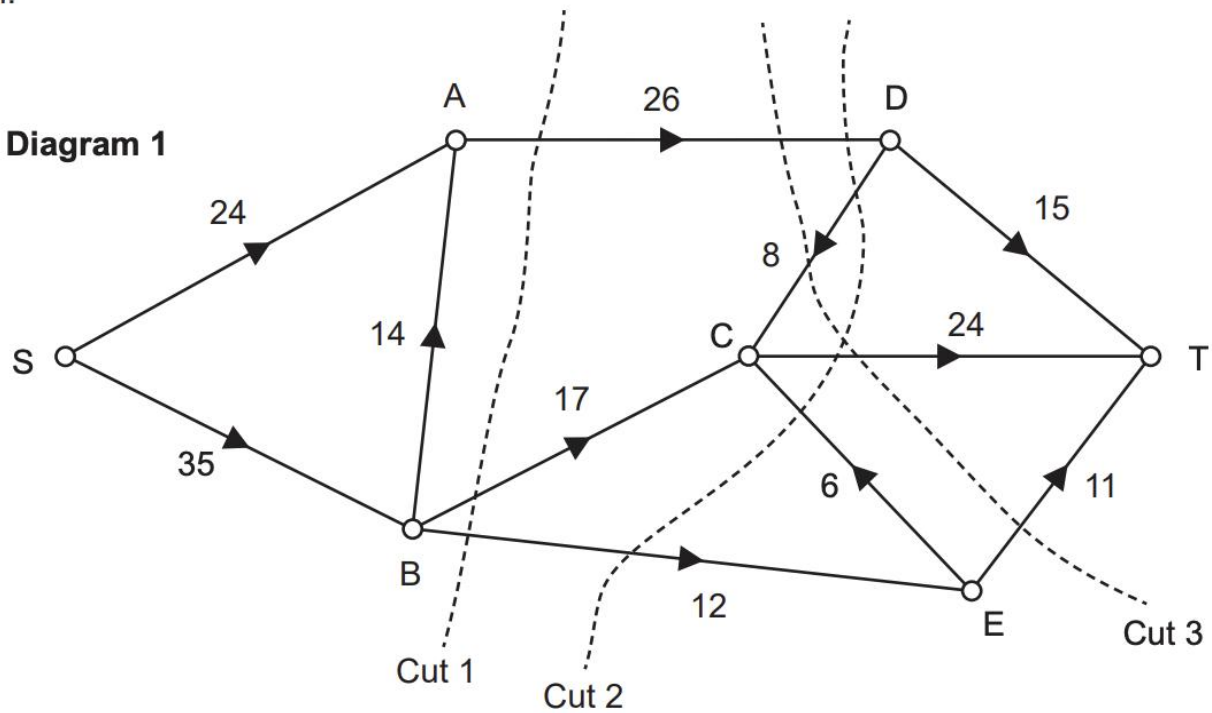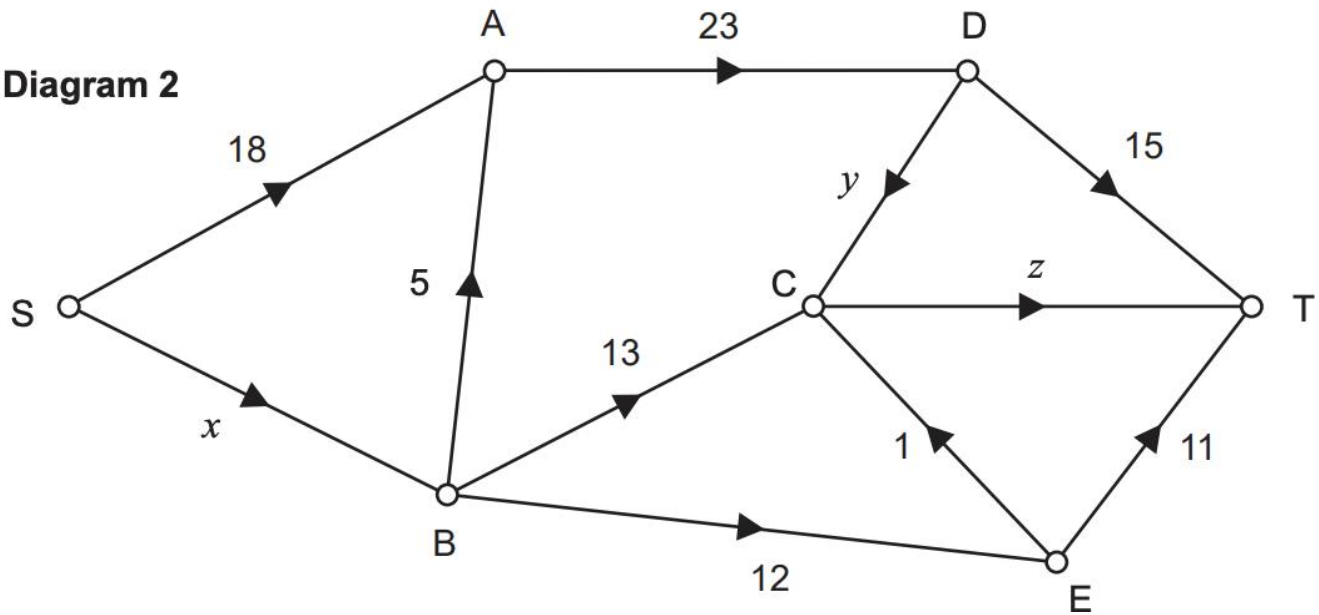**Question 17** **(11 marks)**

Diagram 1 shows a network of pipes. The number on each edge gives the capacity of that pipe in L/min.

Diagram 1

(a) State the capacities of the three cuts in Diagram 1. (3 marks)

Diagram 2 shows a possible flow for the network of pipes.

Diagram 2

A — 23 → D

S — 18 → (towards A)

5 (B to A)

y (D to C)

15 (D to T)

C

z (C to T)

T

13 (B to C)

x (S to B)

B

12 (B to E)

1 (E to C)

11 (E to T)

E

(b)   (i)   Explain why the value of x is 30.   (1 mark)

       (ii)   Calculate the values of y and z.   (2 marks)

(c)   State which of the pipes are at full capacity in Diagram 2.   (2 marks)

(d)   State the value of the flow for the network in Diagram 2.   (1 mark)

(e)   (i)   The value of the flow for Diagram 2 can be increased by 2 L/min. List the series of
              pipes that could be used to achieve this.   (1 mark)

(ii)   Show that the increased flow in part (e)(i) is a maximum for this network of pipes.

(1 mark)