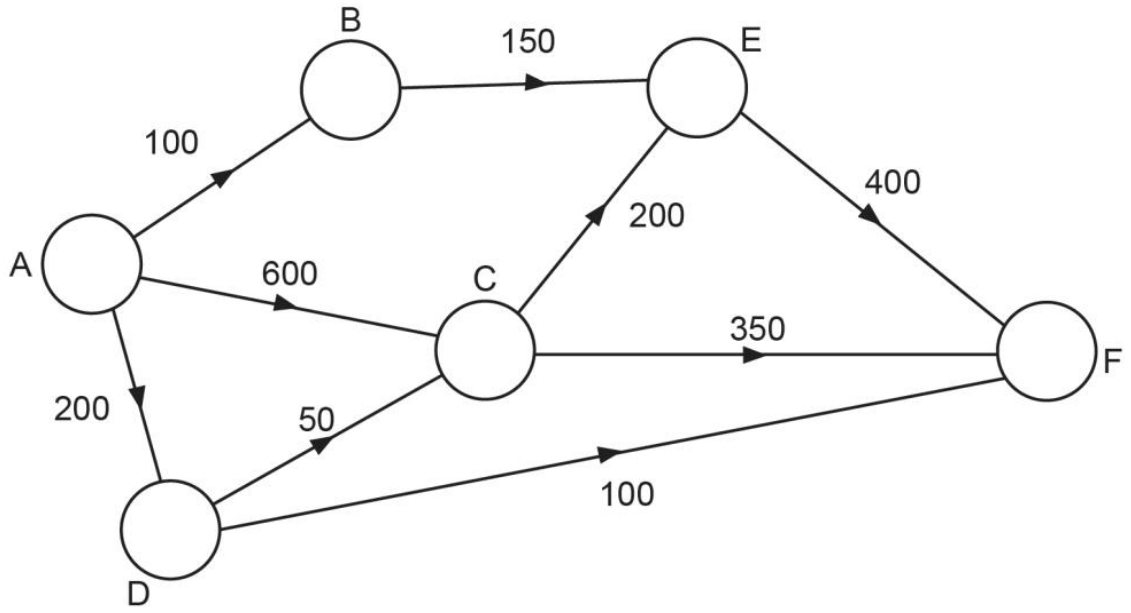
**Question 9** **(8 marks)**

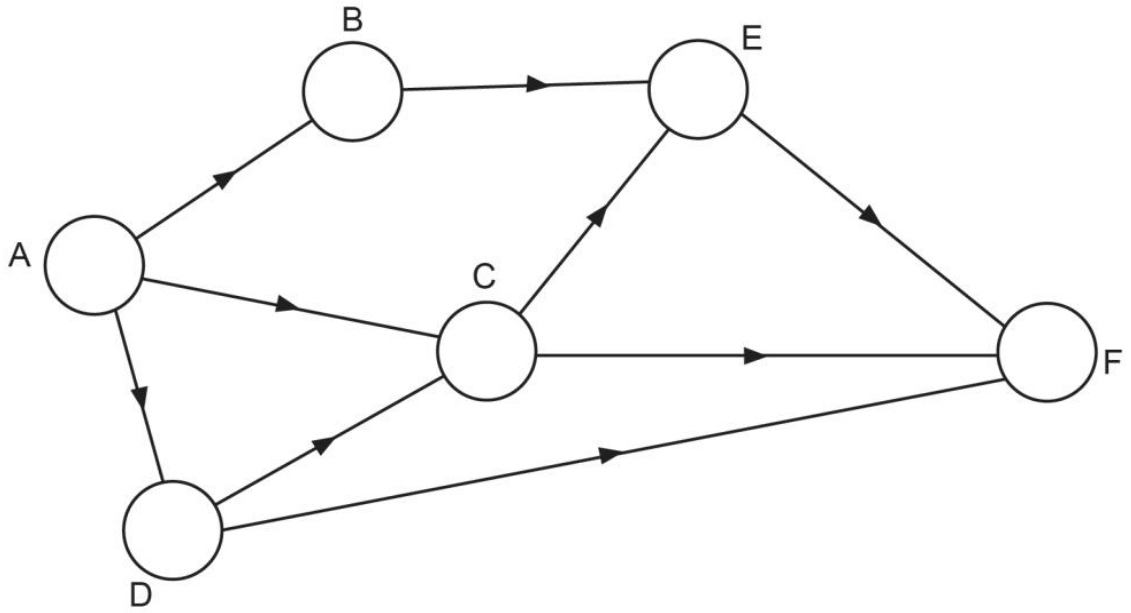
The network below shows the maximum rate of water flow (in litres per minute) through a system of water pipes from a source at A.




(a) What is the maximum amount of water that could be delivered to F, in litres per minute? (List each path used and the corresponding flow). (3 marks)

(b) Verify the maximum flow obtained in part (a) by showing a minimum cut on the given network. (1 mark)

(c) Relabel the network below, showing the flow you would direct along each pipe in order to achieve the maximum flow found in part (a) to point F. (1 mark)




(d) When the maximum flow occurs from A to F, how much of the water, in litres per minute, passes through C? (1 mark)

(e) The water flow through C, as calculated in part (d), is reduced to a maximum of 480 litres per minute. In order to maintain the same maximum flow as that obtained in part (a), the capacity of a single pipe (arc) is to be increased by the least amount. Which pipe should be chosen, and by how much should its capacity be increased? (2 marks)