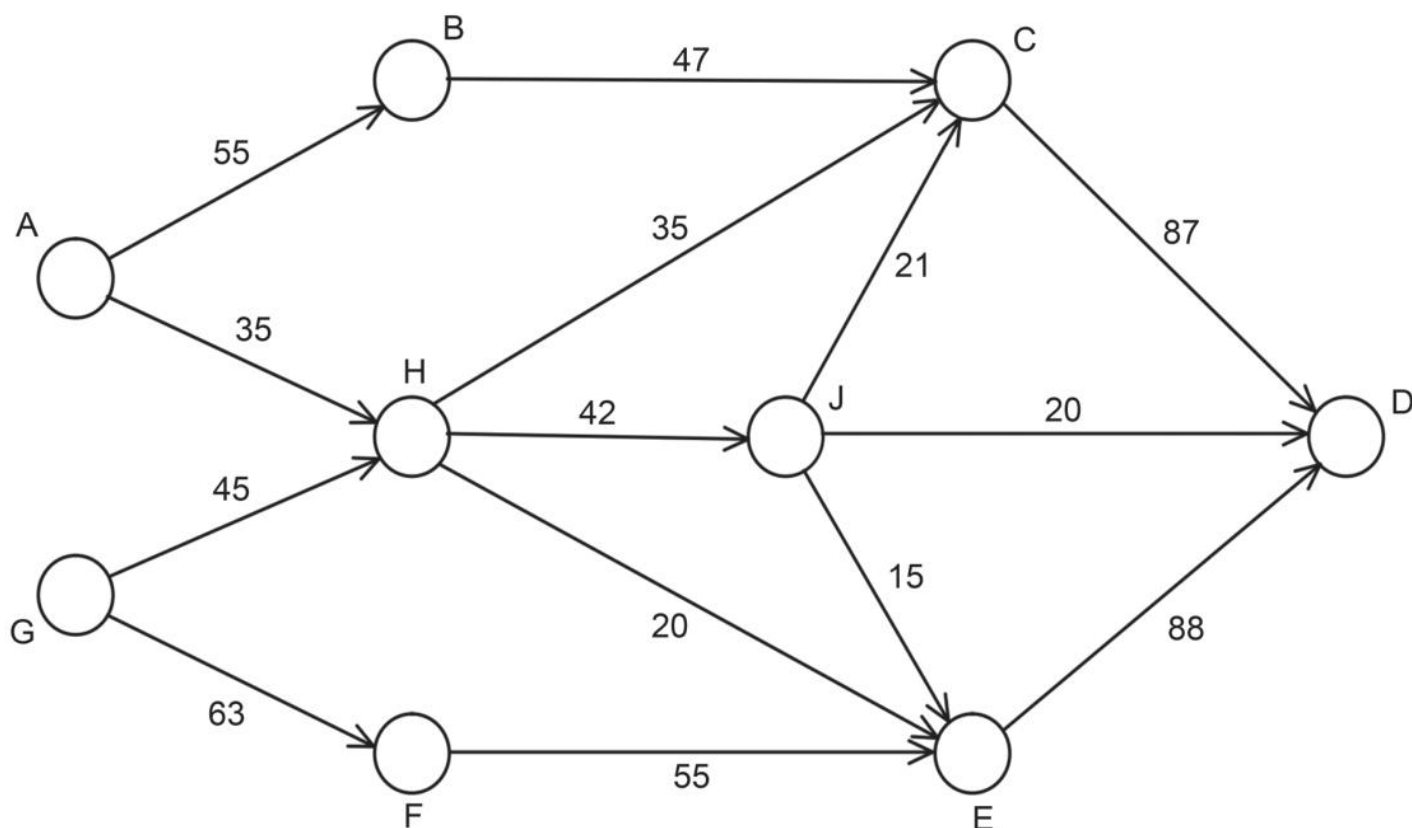


Question 3**(11 marks)**

An oil and gas company has two wells that produce natural gas. The gas is transported under pressure, through a network of pipes, to a refinery. Compressor stations are placed at intervals to ensure the gas remains pressurised for maximum flow through the pipes. The network below shows the capacity of the flow through each pipe in cubic metres per hour.

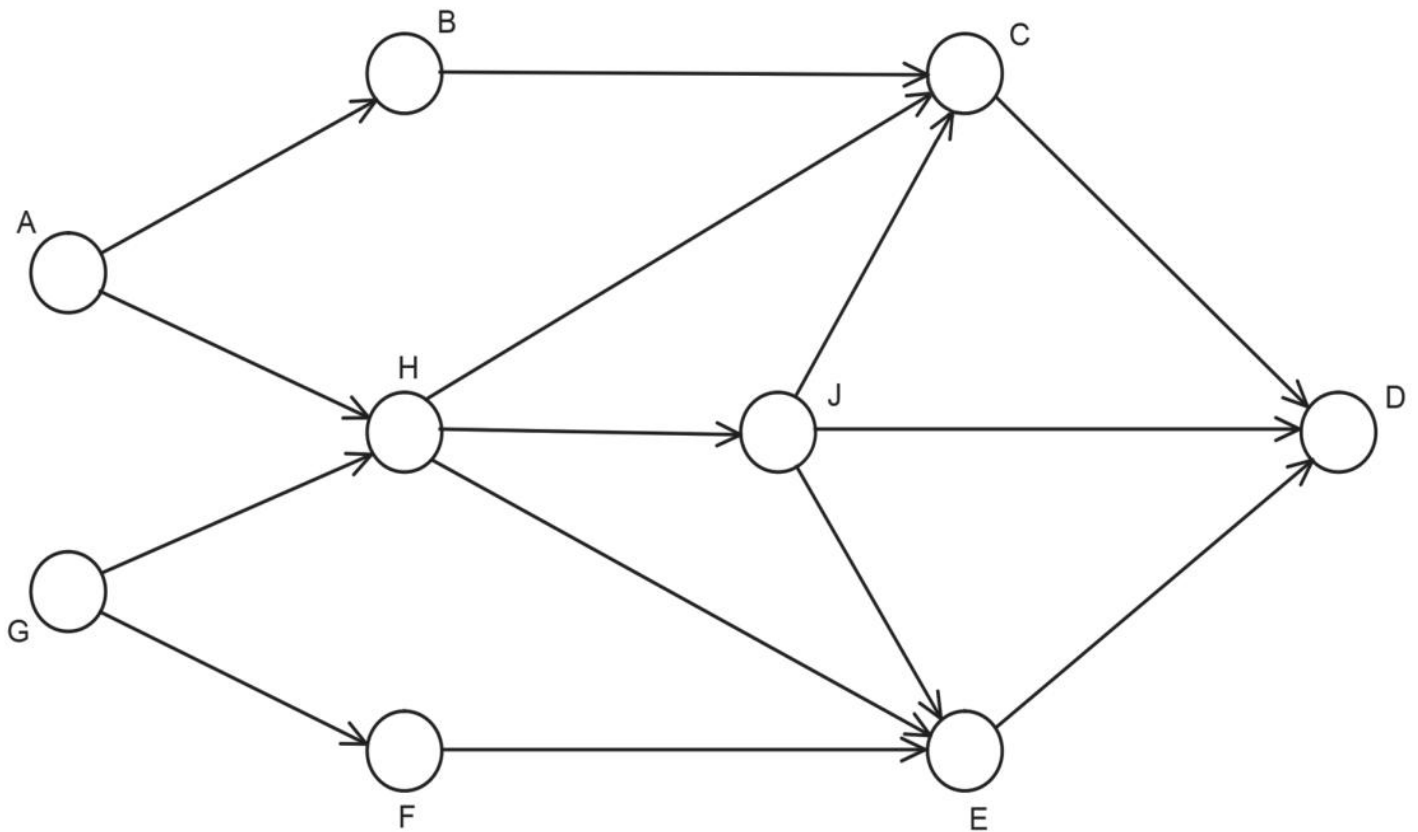


(a) Identify the source(s) and the sink(s). (2 marks)

(b) Determine the maximum flow of gas through the network. Show systematic workings. (4 marks)

(c) Draw the minimum cut that corresponds to the maximum flow on the network above. (1 mark)

- (d) Indicate on the network below the flow through each pipe corresponding to the maximum flow determined in part (b). (2 marks)



- (e) As the refinery is not working at full capacity, the company plans to increase the capacity of the flow through **one** section of pipe (AB or FE) from 55 to 65 cubic metres per hour. Which section should they choose for the best improvement in total gas flow and how will this change the maximum flow? (2 marks)