Maximum-flow models

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. A route S→A→T has capacities 9 and 5 L/s. What is its largest flow? [2 marks]

Both edges carry the same route flow.

The smaller capacity limits it.

Answer: 5 L/s.

2. Two edge-disjoint routes have bottlenecks 4 and 7 vehicles/min. Find their total possible flow. [2 marks]

There is no shared constrained edge.

$4 + 7 = 11$.

Answer: 11 vehicles/min.

3. A junction receives 6 and 3 L/s. One outgoing edge carries 4. Find the other outflow. [2 marks]

Total inflow is 9.

Conservation gives $9 - 4 = 5$.

Answer: 5 L/s.

4. A feasible flow equals 18 and a cut has capacity 18. What follows? [2 marks]

Feasibility gives a lower bound of 18.

The cut gives the same upper bound.

Answer: The maximum flow is 18.

5. An edge has capacity 8 vehicles/min but assigned flow 10. Is it feasible? [2 marks]

It exceeds capacity by 2.

Capacity cannot be exceeded.

Answer: No.

6. A cut has forward capacities 7 and 5 and a backward capacity 4. Find its forward capacity. [2 marks]

Only forward crossings count.

$7 + 5 = 12$.

Answer: 12.