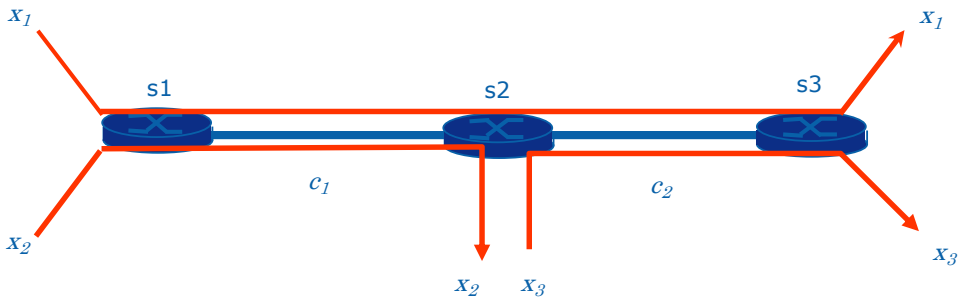
**COMPUTER SCIENCE TRIPOS Part II – 2026 – Paper 9**

## 11 Principles of Communications (jac22)

(*a*) Open-loop flow control systems typically employ packet scheduling to ensure isolation and fairness. What is the key purpose of the associated component functions of admission control and policing? [5 marks]

(*b*) The figure shows a simple network with three switches s1, s2, and s3. The network has the following characteristics:

Links $c_1$, $c_2$ are both 1 Mbps, with 10ms one-way propagation delay.
Ingress ports at switches s1 and s2 are both 10 Mbps.
There are three flows $x_1$, $x_2$, and $x_3$ with the following characteristics:
for $x_1$ 100 packets per second, 1 Kbyte packets (1K=1000), bursty;
for each of $x_2$ and $x_3$, 20 packets per second, 400 byte packets, constant rate.




(*i*) What is the worst case end-to-end delay for flow $x_2$ induced at s1 by flow $x_1$'s burstiness? Assume that the routers implement a simple, per-flow Weighted Round Robin scheduler which is fair on a packet-rate basis. Clearly state any other assumptions you make in your answer. [8 marks]

(*ii*) Flow $x_3$ joins the network at switch s2 where $x_2$ leaves. Can we make one simple assumption to work out what latency $x_3$ will experience? [2 marks]

(*c*) Discuss the impact on worst case end-to-end latencies experienced by the three traffic flows if the routers implemented FIFO/FCFS, rather than Weighted Round Robin scheduling. [5 marks]