MODULE E NETWORKS · E5

Star and mesh topologies: mark scheme

20 marks · OCR J277 spec 1.3.1

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative answers; **//** separates alternative statements for the same mark. Words in (brackets) are not needed for the mark. Credit any other valid answer that shows the same understanding.
Spec points (J277 1.3.1). Star and Mesh network topologies; Advantages and disadvantages of the Star and Mesh topologies; Apply understanding of networks to a given scenario. The spec does not separate full and partial mesh; this worksheet uses full mesh where it matters (Q3, Q4) and says so.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.3.1	A: star B: mesh / full mesh	**2**	1 mark each. Do not accept bus / ring / client-server / peer-to-peer.
1(b) J277 1.3.1	Switch	**1**	Accept "central switch". Do not accept hub, router or server (OCR examiners' report, June 2024: candidates confused a switch with a hub).
2(a) J277 1.3.1	A central device drawn and labelled switch All five devices (3 desktops, laptop, printer) drawn and labelled Each device connected directly to the switch with one line, and no other connections	**3**	1 mark per bullet. Third mark: no extra links between devices (that would make a mesh) and no extra central device such as a router or server between devices and switch (OCR report, June 2024). A server may be shown only if it is not the centre. Accept the laptop linked wirelessly to a WAP that is connected to the switch only if all else is a star; BOD.
3(a) J277 1.3.1	Every device connected to every other: Full mesh Central device fails, nothing communicates: Star One cable fails, others still communicate: Both One connection each, to the central device: Star	**4**	1 mark per correct row. 2+ ticks in a row = 0 for that row. Row 3: in a star, one failed cable drops only that device; in a mesh another route is used, so "Both".
4(a) J277 1.3.1	10	**1**	Correct answer only. (5 × 4 ÷ 2 = 10; the formula is not needed.)

QUESTION	ANSWER	MARKS	GUIDANCE
4(b) J277 1.3.1	The data takes another / an alternate route ... via (one of) the other computers // through another computer that is connected to both Each computer is still connected to every other computer (except along the damaged cable) / there are multiple routes between devices	**2**	1 mark per bullet, max 2. "The network still works" alone = NE. Do not accept "it goes through the switch" (no switch in a mesh).
5(a) J277 1.3.1	Easy to add new devices (1) ... new staff computers only need one cable plugged into the switch (1) If one cable / computer fails, the rest of the network still works (1) ... other staff can still reach the file server (1) Switch sends data only to the intended device (1) ... so less traffic / fewer data collisions on the network (1) Fewer cables than a mesh / one cable per device (1) ... lower cabling cost for twelve computers (1) Easy to find faults / a fault is limited to one cable (1) ... the faulty computer's cable can be checked on its own (1)	**2**	Mark in pairs: 1 for the advantage, 1 for the explanation in context; the second depends on the first. Do not accept "faster" / "cheaper" alone (NE).
5(b) J277 1.3.1	If the (central) switch fails the whole network fails // single point of failure (1) ... no computer could reach the file server / staff could not work (1) Cost of buying the central switch (1) ... and a bigger / extra switch may be needed as staff numbers grow (1) Each device needs its own cable to the switch (1) ... so adding many staff computers means running many cables to one place (1) The switch has a limited number of ports (1) ... it may run out as more staff join (1)	**2**	Mark in pairs as 5(a). Do not accept "slower" / "less secure" alone (NE).
6(a) J277 1.3.1	Choice: Mesh (no mark) There are multiple / alternate routes between devices No single point of failure // if a connection / device fails the others can still connect (Applied) so the monitoring of the pumps / valves keeps working when one cable / computer fails A star depends on one central switch, so one fault could stop all monitoring	**3**	No mark for choice. If star is chosen, 0 marks for the part. 1 mark per bullet, max 3; for 3 marks at least one point must be applied to the water works. Do not accept faster/slower transmission speeds (OCR mark scheme, June 2025). Accept partial mesh if justified by alternate routes.

Total: 20 marks