MODULE E NETWORKS · E11

Layers and the 4-layer TCP/IP model: mark scheme

20 marks · OCR J277 spec 1.3.2 (The concept of layers)

How to use. 1 mark per bullet up to the maximum shown. **/** separates alternative answers. Words in (brackets) are not needed for the mark. Credit any other valid answer that shows the same understanding. **Spec note:** J277 says knowledge of the names and function of each TCP/IP layer is **not required**. No answer here needs layer names; credit correct use of names (application, transport, internet, link / network access) but never require them. Do not award descriptions of what each layer does in place of a benefit.

QUESTION	ANSWER	MARKS	GUIDANCE
1(a) J277 1.3.2	A division / part of network functionality / communication that carries out one (specific) job / set of tasks has its own protocols / set of rules uses the layer below / provides services to the layer above	**2**	1 mark per bullet, max 2. Do not accept "a level of the internet" or "a layer of security".
1(b) J277 1.3.2	Own protocols: True Uses the layer above: False Passes down when sent: True Every other layer rewritten: False	**4**	1 mark per correct row. 2+ ticks in a row = 0 for that row.
2(a) J277 1.3.2	4 / four	**1**	Only this answer.
2(b) J277 1.3.2	(On the desktop computer) the file passes down (through) the layers (top to bottom) is sent across the network / transmission media (to the printer server) (On the printer server) it passes up (through) the layers (bottom to top) each layer uses / passes it to the layer below (when sending) / serves the layer above (when receiving)	**2**	1 mark per bullet, max 2. Do not award a reversed direction (up to send / down to receive). Layer names are not needed; credit them if used correctly in order.

QUESTION	ANSWER	MARKS	GUIDANCE
3(a) J277 1.3.2	Breaks a complex task into smaller / manageable parts (1) ... each programmer / group only needs to understand one layer (1) Each layer can be developed / tested separately / independently (1) ... different programmers can work on different layers at the same time (1) One layer can be changed / updated without affecting the other layers (1) ... e.g. the programmers can improve one layer later without rewriting the rest (1) Layers follow standards / agreed protocols (1) ... the thermostats can work with hardware / software made by other companies (1) Each layer is self-contained (1) ... so a bug can be traced to one layer / easier to debug (1)	**4**	Mark in pairs: 1 for the benefit, 1 for the expansion. Do not award the same benefit twice. Do not accept vague answers e.g. "layers make it easier to work with" / "easier" / "faster" alone. Do not award descriptions of what the layers do.
4(a) J277 1.3.2	Only one / the bottom layer (that deals with the connection / transmission media) has changed One layer can be changed without affecting the other layers / layers are self-contained / independent The layers above (including the one the program uses) are unchanged / still work the same way Each layer only uses the services of the layer below, (so it does not matter how the layer below does its job) So the program does not need to be rewritten / still sends and receives data the same way	**3**	1 mark per bullet, max 3. Answers must refer to layers; "wireless works the same as cables" alone = 0. Accept "link / network access layer" for the bottom layer but do not require it.
5(a) J277 1.3.2	Each layer follows (agreed) standards / protocols / rules Both manufacturers make their devices to the same standards / protocols So matching layers on each device can work together / interoperability	**2**	1 mark per bullet, max 2. "They are compatible" alone = NE.
6(a) J277 1.3.2	Each layer is self-contained / does a separate job So each layer can be checked / tested on its own The problem can be traced / narrowed down to one layer Only that layer needs fixing / the other layers can be left alone	**2**	1 mark per bullet, max 2. "Easier to fix" alone = NE: must say why (traced to one layer).

Total: 20 marks