Mark schemes

**Q1.**

**Marks are for AO1 (understanding)**

**CSMA/CA and RTS/CTS**

•   Transmitting device checks for traffic;

•   If (data) signal present/another transmission is in progress, then the transmitter continues to wait;

•   If the channel is detected as idle, the transmitter would send a request to send (RTS);

•   Receiver/WAP (**A.** router **R.** server) responds (to RTS) with a Clear to Send (CTS) signal

•   If CTS is not received, the transmitter would wait a random amount of time/until the end of the transmission before resending the RTS;

•   When CTS is received, the transmitter begins transmitting data;

•   Receiver sends acknowledgement (ACK) (if all data is received);

•   If no ACK received then data is resent;

**Max 6** for CSMA/CA and RTS/CTS

**Majority Voting**

•   The transmitter would send each bit / byte / bit pattern (**R.** data) an odd number of times (greater than 2); **A.** multiple times / specified odd number greater than 2

•   The receiver checks the bits / byte / bit pattern received and if they are not all the same it assumes the one it received the most copies of is the correct value;

**R.** Receiver knows the data is correct

**Max 2** for majority voting

**Max 8** in total

**[8]**

**Q2.**

**Marks are for AO1 (understanding)**

**Physical:** The (physical) layout / arrangement / architecture of the cabling / wiring / connections (between the devices / computers on the network);

**A.** The (physical) layout / arrangement / architecture of the devices / computers / network

**N.E** How the devices / computers are connected to each other

**N.E** “Setup” for layout

**N.E** List of topologies eg bus, star

**Logical:** How the data / packets flow around a network // architecture of the communication mechanism in a network;

**A.** Conceptual way that data moves around a network

**A.** The type of protocol used (must be related to logical topology)

**N.E** How a network operates / behaves

**[2]**

**Q3.**

(a)     System will be storing confidential / personal data
(that must be kept securely / safely);

Centralised / improved security management // centralised login system //
centralised administration // administration will be easier;
Centralised backup;
Harder for users to change security/sharing settings;
Running database from a server will avoid concurrency issues // will avoid problems if two users / computers update (a record in the) database simultaneously;
**A** will allow simultaneous updates / access
**R** answers that imply that on a peer-to-peer system there would be a separate copy of the database on each workstation
Running database from server will ensure that it is always available (as server is unlikely to be turned off) // Files would always be available (as server is unlikely to be turned off);
Server (operating system) may allow more simultaneous connections than a workstation // (operating system software on) workstations may not allow enough simultaneous connections for ten users;

**NE** the database could be stored on the server

**Max 2**

(b)     **Subject-related points:**

**How works:**All / most processing done by (central) server;
**A** all software run on server
Keystrokes/mouse clicks / user input transmitted from workstation/terminal to server over network;
**A** workstations are just interfaces
Image / data needed to produce image transmitted from server to terminal over network;
Applications not installed on (thin client) workstations // all applications on server;
Operating system loaded by clients from server at boot;
**Selection of hardware:**Higher bandwidth network connection required;
Network must use switch not hub;
Slower processor / reduced RAM/ no HDD required in workstations;
**A** other examples of limited hardware requirements
**A** ‘Dumb terminal’
Server must have multiple processors/a lot of RAM;

**NE** more powerful / less powerful, higher performance / lower performance, cheaper / more expensive

**A** the opposite of points e.g. for ‘Slower processor’ accept ‘a thick client system would need a faster processor’.

**How to award marks:**To achieve a mark in this band, candidates must meet the subject criterion (SUB) and all 5 of the quality of language criteria (QWCx).

|  |  |
| --- | --- |
| SUB | Candidate has covered both how a thin-client system works and how this affects the choice of hardware, and has made at least four subject-related points. |
| *QWC1* | Text is legible. |
| *QWC2* | There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear. |
| *QWC3* | The candidate has selected and used a form and style of writing appropriate to the purpose and has expressed ideas clearly and fluently. |
| *QWC4* | Sentences (and paragraphs) follow on from one another clearly and coherently. |
| *QWC5* | Appropriate specialist vocabulary has been used. |

**4**

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QWCx).

|  |  |
| --- | --- |
| SUB | Candidate has covered both how a thin-client system works and how this affects the choice of hardware, and has made at least three subject-related points. |
| *QWC1* | Text is legible. |
| *QWC2* | There may be occasional errors of spelling, punctuation and grammar. Meaning is clear. |
| *QWC3* | The candidate has, in the main, used a form and style of writing appropriate to the purpose, with occasional lapses. The candidate has expressed ideas clearly and reasonably fluently. |
| *QWC4* | The candidate has used well-linked sentences (and paragraphs). |
| *QWC5* | Appropriate specialist vocabulary has been used. |

**3**

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QWCx).

|  |  |
| --- | --- |
| SUB | Candidate has covered one or both of how thin client systems work and how this affects hardware choice. |
| *QWC1* | Most of the text is legible. |
| *QWC2* | There may be some errors of spelling, punctuation and grammar but it should still be possible to understand most of the response. |
| *QWC3* | The candidate has used a form and style of writing which has many deficiencies. Ideas are not always clearly expressed. |
| *QWC4* | Sentences (and paragraphs) may not always be well- connected. |
| *QWC5* | Specialist vocabulary has been used inappropriately or not at all. |

**1–2**

Candidate has made no relevant points.

**0**

*Note: Even if English is perfect, candidates can only get marks for the points made at the top of the mark scheme for this question.*

*If a candidate meets the subject criterion in a band but does not meet the quality of language criteria then drop mark by one band, providing that at least 4 of the quality of language criteria are met in the lower band. If 4 criteria are not met then drop by two bands.*

***4***

(c)     To connect networks using different protocols // to convert transmitted data from one protocol to another;

**1**

**[7]**

**Q4.**

**Marks are for AO1 (understanding)**

A peer-to-peer network does not need a central server;

A peer-to-peer network will be cheaper / easier to set up / maintain;

The students are unlikely to need the extra security provided by a client-server network;

The students are unlikely to need the extra services provided by a client-server network;

**Max 2**

**[2]**

**Q5.**

**Mark is for AO1 (knowledge)**

A set of rules (which govern communication);

**[1]**

**Q6.**

**Marks are for AO1 (understanding)**

A MAC/Media Access Control address is unique to every NIC/Network Interface Card;

A white list only allows those MAC addresses that have been authorised to connect to the network // devices whose MAC addresses are not in the white list are not allowed to connect to the network;

**A**. Device for NIC

**A**. Address for MAC Address

**R**. first mark if not clear that MAC address is unique to NIC/device

**R**. IP address for MAC address