Name:

Class Teacher:

Date:

OCR J276

GCSE Computer Science

REVISION BOOKLET – MARK SCHEME

1.5 NETWORK TOPOLOGIES, PROTOCOLS AND LAYERS

Content in J276 GCSE Computer Science:

EXAM QUESTIONS

QUESTION 1

Bill needs to send a document across a network to Ben. Write an algorithm to show how packets are used to send the document, starting from when Bill clicks send (sending), and finishing when Ben reads the document (receiving).

1			Sending; • Bill's computer splits data into equal sizes packets (1) • Each packet is given the address of Ben's computer (1) • Each packet is given a number (1) • Each packet is given error checking data (1) • The packets are sent across the network (1) Receiving; • Ben's computer checks if all packets have been received? (1) • If No… • …Check again (1) • …Increment timer (1) • …If timer > max wait (1) • …Send timeout to Bill's computer (1) • If Yes… • …Reorder packets based on their number (1) • …Display the document (1) • …Send receipt confirmation (1) • …Each packet is checked for errors (1)… • … if corrupt a message is sent back to sender (1)	6	Answers must be a recognisable algorithm. Candidates can use a flow chart or any form of pseudocode. Candidates can only be awarded a maximum of 4 marks for sending or receiving.

QUESTION 2

The owners of a large bakery have a Local Area Network (LAN) with a star topology. They order their supplies over the Internet. When data is transmitted from the bakery to the supplier, network protocols are used. Define what is meant by a 'network protocol'.

2	a		• A network protocol defines rules for data transmission • A network protocol defines standards for data transmission	1	1 mark only to be awarded for a correct definition.

TCP/IP is a set of protocols based on layers. With regards to network protocols, define what is meant by a 'layer'.

	b	i	• A division of network functionality	1	Candidate's responses may differ from the given answer but must represent conceptually the same thing. e.g. "a layer is where jobs/processes are split up" would receive the mark.

Describe **one** advantage of using layers to construct network protocols.

		ii	• It is self-contained (1)… • …it allows different developers to concentrate on one aspect of the network (1) • A layer can be taken out and edited without affecting other layers (1)… • …it promotes interoperability between vendors and systems (1)	2	1 mark to be awarded for the correct identification and 1 for a valid description up to a maximum of 2 marks.

The owners of a large bakery have a Local Area Network (LAN) with a star topology. Explain **four** reasons why the bakery must use a star topology for their LAN.

	c		• It is easy to add a new node or device • Management of the network can be done centrally • Fewer data collisions can occur • If a node or device fails it does not affect the rest of the network • A signal does not need to be transmitted to all computers in the network	4	1 mark is to be awarded for each correct reason to a maximum of 4 marks. Any valid comparisons to other topologies can be awarded marks.

QUESTION 3

A bank uses a local area network to connect all the computers in its head office. Computers in the network can be identified using both IP addresses and MAC addresses. Describe **two** differences between IP addresses and MAC addresses.

3			• IP addresses can be changed / are allocated as needed • MAC addresses can't be changed / every device has a fixed MC address • IP(v4) addresses are 4 bytes long • MAC addresses are 6 bytes long • IP(v4) addresses are normally written in denary • MAC addresses are normally written in Hex • IP addresses are configured by software • MAC addresses are configured in hardware • IP addresses are used for routing across a WAN / internet • MAC addresses are only used within the LAN [marks in pairs, maximum 2 pairs]	4	For bullets 3 and 4, accept answers where candidates refer to IPv6 being 16 bytes (128 bits). Award one mark if candidates state that IP addresses and MAC addresses are of different size.