Name

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CIE Computer Science

CHAPTER 2 – Data Transmission

1)

Parity checks are used to check for errors during data transmission. A system uses odd parity.

(a) Complete the following two bytes of data so that they both have odd parity:

1	1	1	1	1	0	0	0
0	0	0	0	0	1	1	1

2

[2]

(b) Name and describe another method which can be used to check whether data has been correctly transmitted.

Name of method checksum echo check

Description data received is sent back to sending device. if data matches, check complete. if data is different, data is resent until it matches

2

[2]

2)

Parity checks can be used to check for errors during data transmission.

One of the bytes has been transmitted incorrectly.

Byte 1	Byte 2	Byte 3	Byte 4
10110011	10101000	10110100	10110101

(a) State which byte was incorrectly transmitted.

byte 3

1

[1]

(b) Explain how you identified the incorrectly transmitted byte.

All the other bytes had an odd number of 1s. This indicates an odd parity check has been used. However, byte 3 has an even number of ones so therefore, ~~their~~ these must be an error in its data.

3

[3]

3)

The three binary numbers in the registers X, Y and Z have been transmitted from one computer to another.

								Parity bit	
Register X	1	0	0	1	0	0	1	0	odd
Register Y	1	1	1	0	0	1	1	1	even
Register Z	1	1	1	0	1	0	0	1	odd

Only **one** binary number has been transmitted correctly. This is identified through the use of a parity bit.

Identify which register contains the binary number that has been transmitted **correctly**. Explain the reason for your choice.

The binary number that has been transmitted correctly is in **Register** ..Y..

Explanation ..In two registers, there is an odd number of 1s. In register Y, there is an even number. A parity check can either be set to odd or even. If only one of the binary numbers has been transmitted correctly, it must be the ~~one~~ odd one out, register Y is the only register with an ~~even number of~~ number of 1s.

4/ [4]

4)

(a) State what is meant by the terms:

Parallel data transmission ..... several bits of data are sent at the ~~same time~~ same time down several wires .....

Serial data transmission ..... each bit of data sent one at a time down a single wire .....

[2]

(b) Give **one** benefit of each type of data transmission.

Parallel data transmission

Benefit ..... it is fast .....

Serial data transmission

Benefit ..... no risk of data being skewed or out of order at destination .....

[2]

(c) Give **one** application of each type of data transmission. Each application must be different.

Parallel data transmission

Application ..... connections between a computer and a printer (parallel printer port and cable) .....

Serial data transmission

Application ..... transmission of data ~~between~~ between two computers .....

[2]

5)

Parity checks are often used to check for errors that may occur during data transmission.

(a) A system uses **even parity**.

Tick (✓) to show whether the following three bytes have been transmitted correctly or incorrectly.

Received byte	Byte transmitted correctly	Byte transmitted incorrectly
11001000		✓ ✓
01111100		✓ ✓
01101001	✓	✓

odd
odd
even

[3]

(b) A parity byte is used to identify which bit has been transmitted incorrectly in a block of data.

The word "F L O W C H A R T" was transmitted using nine bytes of data (one byte per character). A tenth byte, the parity byte, was also transmitted.

The following block of data shows all ten bytes received after transmission. The system uses **even parity** and column 1 is the parity bit.

	letter	column 1	column 2	column 3	column 4	column 5	column 6	column 7	column 8	
byte 1	F	1	0	1	0	0	1	1	0	even
byte 2	L	1	0	1	0	1	1	0	0	even
byte 3	O	1	0	1	0	1	1	1	1	even
byte 4	W	1	0	1	1	0	1	1	1	even
byte 5	C	1	0	1	0	0	0	1	1	even
byte 6	H	0	0	1	0	1	0	0	0	even
byte 7	A	0	0	1	0	0	1	0	1	odd
byte 8	R	1	0	1	1	0	0	1	0	even
byte 9	T	1	0	1	1	0	1	0	0	even
parity byte		1	0	1	1	1	1	1	0	even

(i) **One** of the bits has been transmitted incorrectly.

Write the byte number and column number of this bit:

Byte number ..7.. ✓

Column number ..6.. ✓ 2

[2]

6)

(a) **Three** descriptions and **two** methods of data transmission are given.

Tick (✓) the correct box to show the **Method** of data transmission for each description.

Description	Method	
	Serial	Parallel
Multiple bits are sent and received at the same time.		✓
Bits are sent one at a time in a single direction.	✓	
Bits are sent using a single wire. Data can be sent or received, but not at the same time.	✓	

3

[3]

(b) **Three** descriptions and **three** types of data transmission are given.

Tick (✓) the correct box to show the **Type** of data transmission for each description.

Description	Type		
	Simplex	Half-duplex	Duplex
Multiple bits are sent and received at the same time.			✓
Bits are sent one at a time in a single direction.	✓		
Bits are sent using a single wire. Data can be sent or received, but not at the same time.		✓	

3

[3]

7)

A file server is used as a central data store for a network of computers.

Rory sends data from his computer to a file server that is approximately 100 metres away.

It is important that the data is transmitted accurately. Rory needs to be able to read data from and write data to the file server at the same time.

(a) (i) Use ticks (✓) to identify the most suitable data transmission methods for this application.

Method 1	Tick (✓)	Method 2	Tick (✓)
Serial	✓	Simplex	
Parallel		Half-duplex	
		Duplex	✓

[2]

(ii) Explain why your answer to **part (a)(i)** is the most suitable data transmission.

Serial data transmission because he needs ~~it to be~~ data to be transmitted ~~accurately~~ accurately., with serial, no risk of data skewing., ~~data~~ will be in order. The file server is also ~~very close so speed of parallel data transmission~~ far away which would increase chances of data skewing if parallel data transmission was used. Duplex is needed as in order to ~~read/write~~ data and write data at the same time, bits need to be able to be sent and received at the same time. 4/[4]

8)

Carla's computer has a USB port.

Carla uses the USB port to connect her mobile device to her computer, to transfer her photos.

(a) Give **three** benefits of using a USB port to connect the mobile device to the computer.

Benefit 1 ~~dev~~ USB is automatically recognized, correct device drive automatically loaded up

Benefit 2 no external power source needed, cable provides power

Benefit 3 USB backward compatible, no wrong connection ~~can be~~ when plugging in [3]

(b) State the type of data transmission used when transferring data using a USB port.

half duplex [1]

9)

Two error detection methods that Allison's computer uses are check digit and checksum.

(a) Give **two** similarities between the check digit and checksum methods.

1 both create a ~~number~~ number to be checked and matched after data transmission

2 both ~~numbers~~ numbers located on the right side of data [2]

(b) Identify **one other** error detection method that Allison's computer could use.

Describe how the method checks for errors.

Method ~~a~~ parity check

Description seven bits of data in byte, one bit @ left is the parity bit. If an odd parity check is used, the number of 1s in byte will be odd Parity bit will be 1 or 0 depending on rest of data. If the odd parity check is used and ~~is~~ number of 1s in data received is even, it would show an error has occured. [4]

10)

A company has a website that is stored on a web server.

(a) The website data is broken down into packets to be transmitted to a user.

Describe the structure of a data packet.

Data packet split into three parts:
packet header - contains IP addresses of sending and receiving devices, sequence number of packet so data can be reassembled and size of data packet so it is known when the entire packet has been received
payload - ~~the~~ contains the actual data
packet trailer - contains an error check, is a way of knowing when entire packet has been received. 4/[4]

END OF TEST