Name__

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CIE Computer Science

CHAPTER 2 – Data Transmission

35

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]

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

Name of method ARQ

Description using positive or negative acknowledgements. The recieving device can send acknowledgements of recieving the data to make sure that all the data is transmitted if no acknowledgement is recieved - the timeout is activated. 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

5 3 4 5

(a) State which byte was incorrectly transmitted.

Byte 3 1 [1]

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

If an even parity check was used, bytes 1, 2, 4 would be wrongly transmitted. Only one byte has been wrongly transmitted

With an odd parity check, Byte 2 is wrongly transmitted. This is as there are an even number of bytes. 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	3
Register Y	1	1	1	0	0	1	1	1	6
Register Z	1	1	1	0	1	0	0	1	5

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 If an ~~even~~ odd parity was used ~~on~~ ~~by~~ ~~ter~~ register X and Z would be correct as the number of ones is odd. If an even parity was used register Y would be correct as the number of ones is even. If only one register is correct the parity must be even and register Y correct.
must be

4/

[4]

4)

(a) State what is meant by the terms:

Parallel data transmission Data is transmitted through multiple wires at the same time. The order of the data is configured at the recieving end.

Serial data transmission Data is transmitted 1 bit at a time through one wire.

1 [2]

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

Parallel data transmission

Benefit Data transmission is faster.

Serial data transmission

Benefit Data transmission has a lower chance of interference and mistakes.

2 [2]

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

Parallel data transmission

Application Between a computer and printer

Serial data transmission

Application Telephone wires

2 [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		✓

[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
byte 2	L	1	0	1	0	1	1	0	0
byte 3	O	1	0	1	0	1	1	1	1
byte 4	W	1	0	1	1	0	1	1	1
byte 5	C	1	0	1	0	0	0	1	1
byte 6	H	0	0	1	0	1	0	0	0
byte 7	A	0	0	1	0	0	1	0	1
byte 8	R	1	0	1	1	0	0	1	0
byte 9	T	1	0	1	1	0	1	0	0
parity byte		1	0	1	1	1	1	1	0

(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]

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]

(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 ~~allo ha~~ does not require ordering and has lower interference than parallel. This increases the accuracy of transmission. Additionally, 100m is a large distance that is expensive for the multiple wires used in parrallel.

Duplex connections allow read data from the server and write data to be sent simultaneously, which is necessary for the file server. 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 It powers/charges the phone ✓

Benefit 2 The speed of transmission is fast ✓

Benefit 3 The port is universal ∴ connection is easier/less prone to error. ✓

3/ [3]

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

Serial ✓ 1/2 duplex

9/ [1]

9)

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

check digit of calc ↓ check

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

1 They both use pre-calculated values ✓

2 ~~The Both calculated value are verified at the recieving end.~~ The is a They both use the same operation on the recieving end to verify the pre-calculated value. ✓

2/ [2]

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

Describe how the method checks for errors.

Method ARQ ✓

Description The ARQ can be configured for positive or negative acknowledgement. ✓

With positive acknowledgement, the recieving device transmits a positive acknowledgement after every packet. If the acknowledgement is not recieved, the data transmission ends. With negative acknowledgement, the recieving device only transmits ~~data~~ on acknowledgement if the data is transmitted incorrectly. If When the acknowledgement is recieved, the data is retransmitted.

4/ [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.

The packet has a header, payload and footer.

The header contains the recipient's IP address.
The payload contains the data itself.
The footer contains the error detection method used as well as the index of the packet in the transmitted data. It also contains the sender's IP address to request re-transmission

4 [4]

END OF TEST