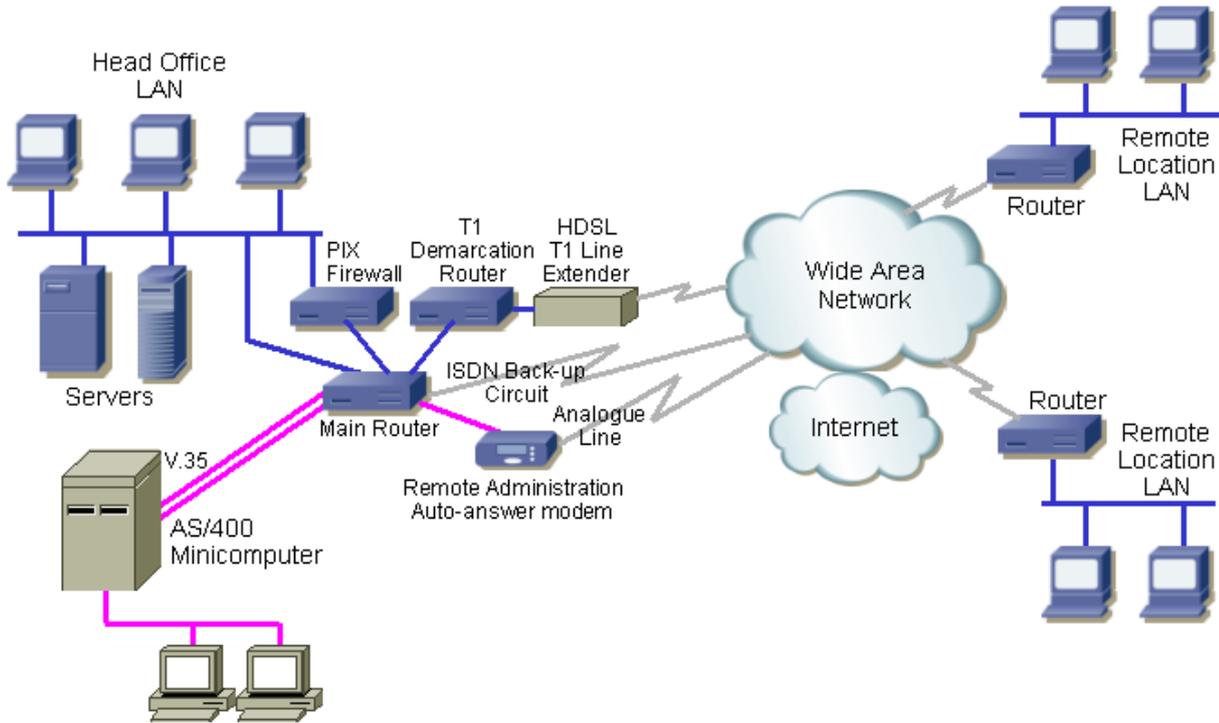## Topic: 1.2.1 Data transmission

May/June 2006 P1 (7010)

3 (a) Give one effect of hacking. [1]
(b) Give two ways of protecting computer systems against hacking. [2]

10 Many bank customers now bank on-line using the Internet.
(a) State two advantages for the bank of on-line banking. [2]
(b) State two disadvantages for a bank customer of on-line banking. [2]

12 A music club keeps its members' details on a computer file.
(a) Complete the table below which shows the data type, field length and validation checkused for the club members' data.

Topic: 1.2.1 Data transmission

	Data type	Field length	Validation check
Name			
Address			
Date of birth			
E-mail address			

[4]

May/June 2003 (9691)

2.   (c)   State two advantages and one disadvantage of having a network of computers, rather than a series of standalone machines, in a school classroom.   **[3]**

7.   (a)   Explain the difference between
            (i)   Serial and parallel modes of data transmission.   **[4]**
      (b)   When data is transmitted it is subject to corruption. Explain how a parity check could be used to determine whether corruption has taken place.   **[4]**

Oct/NOV 2003(9691)

7.   A college has a number of stand-alone machines. The decision is taken to turn them into a LAN.
      (a)   State two items of hardware and one of software which will be necessary for the conversion.   **[3]**
      (b)   Explain why students find that access to text based files does not cause a problem,while graphics files download very slowly.   **[2]**

      (c)   State two advantages and two disadvantages of the college converting to a network system.   **[4]**
      (d)   (i)   Explain why a protocol is needed for this network.   **[4]**

May/June 2004(9691)
5.   (b)   (i)   Describe how buffers and interrupts are used in the transfer of data from primary memory to secondary storage.   **[5]**
            (ii)   State which of the modes of data transmission would be most suitable for theprocedure in (i), justifying your answer.   **[2]**

Oct/NOV 2004(9691)
5.   (a)   State what is meant by a protocol.   **[2]**
      (b)   Describe two features of a protocol necessary for the successful transmission of databetween two devices.   **[4]**

Topic: 1.2.1 Data transmission

May/June 2005(9691)

6. (b) A school computer room is to be equipped with a network of machines.
Give three advantages and one disadvantage of installing a network compared to stand alone machines. **[4]**

12. (a) State the meaning of
(i) serial,
(ii) parallel,
modes of data transmission. **[4]**

Oct/NOV 2005(9691)

5. (a) Errors can occur when data is transmitted from one device to another.
Explain how achecksum can be used to monitor a transmission for errors. **[3]**

May/June 2006(9691)

4. (a) State two ways in which a local area network (LAN) differs from a wide area network(WAN). **[2]**
(c) (i) Explain what is meant by the term protocol. **[2]**

Oct/NOV 2006(9691)

5. (a) State what is meant by the following types of data transmission.
(iii) Serial.
(iv) Parallel. **[4]**

(c) State two of the modes of data transmission mentioned in part (a) which would be used to transfer data from primary memory to a hard drive. Give reasons for your answers. **[4]**

6. Authors send books to a publishing company. At this stage books are text documents with anyillustrations being added at the end of the publishing process.
When a book is sent to the company by an author, it is sent in hard copy form as well as on adisk. It is read and, if accepted, is then sent electronically to a person called a copy editor. Thecopy editor reformats the text to make it suitable for publication.
(a) Explain why the original copy of the book is in
(i) hard copy form; **[2]**
(ii) electronic form on a disk. **[2]**

(c) All copy editors are expected to have a stand-alone computer.
Copy editors need to communicate with head office. State what extra hardware and software the company would have to supply to each copy editor to allow this communication. Givereasons for your answers. **[4]**

7. (b) (ii) During transmission data can be corrupted. Check sums and parity checks can be carried out on the data.
Explain how check sums and parity checks are used to detect transmission errors. **[4]**

Topic: 1.2.1 Data transmission

May/June 2007 (9691)

A garage sells cars and also has servicing and parts departments.Details of customers who purchase cars are stored in a file.Details of cars for sale are stored in another file. Some computers are used in the offices for clerical tasks like word processing and accounting. Someare in the showroom so that customers can see details of cars and videos of them being driven.Thecomputers used at the garage are networked and all data is stored on a central server.

10. (a) State a difference between a local area network (LAN) and a wide area network (WAN). **[1]**

Oct/NOV 2007(9691)

11. The data which is transmitted between survey sites and head office is liable to errors. Data which is received is checked for errors.
    (a) One method of checking for errors is to use parity checks.
        The following four bytes have been received:
        01101001   10111100   10101010   00100100
        (i) One of the bytes contains an error. State which byte. **[1]**
        (ii) Explain your choice of answer in (i). **[2]**
        (iii) Explain why a byte may still be in error even if it passes the parity test.**[1]**
    (b) A second method of checking for errors is to use check sums.
    Explain how check sums are used to check data for transmission errors. **[4]**

Oct/NOV 2008(9691)

6. (a) State two extra pieces of hardware and one piece of software which would be necessary to create the network. **[3]**
   (b) A protocol will be required.
       Explain what is meant by a protocol. **[2]**
   (c) Discuss the advantages and disadvantages of networking the computers. **[5]**

May/June 2009(9691)

6. (a) State what is meant by the following types of data transfer:
       (i) serial, **[1]**
       (ii) parallel, **[1]**

   (b) In a certain computer system parity checking is used to check that data has been transferred correctly. The type of parity checking used is even parity.
       Using the byte 01101001 as an example:
       (i) explain what is meant by an even parity check, **[2]**
       (ii) give an example of an error which would not be detected. **[1]**

Oct/NOV 2009. P11(9691)

8 . (a) The machines in the tax office are networked.
       State two differences between a local area network (LAN) and a wide area network (WAN). **[2]**
    (c) (i) State why the process known as handshaking is necessary between a computer and the file server before use.

Topic: 1.2.1 Data transmission

Oct/NOV 2009. P12(9691)

4. (a) A medical centre has a number of stand-alone computers. It is decided that these should be linked in a LAN.

(i) State three advantages and one disadvantage of networking the computers.
[4]

(b) Describe the additional hardware required when a LAN is connected to a WAN.
[4]

May/June 2010. P11(9691)
4. (a) Define the term protocol. **[2]**

May/June 2010. P12(9691)
4. (a) Define the term protocol. **[2]**

May/June 2010. P13(9691)
1. (b) (i) Explain why a NIC is used when a computer is to communicate with Othercomputers. **[2]**

(ii) State one other piece of hardware which is needed for successful communication to take place. Justify your answer. **[2]**

4. (a) Define the term protocol. **[2]**
(b) (i) Explain what features of a protocol need to be established before communication can take place. **[5]**

Oct/NOV 2010. P11(9691)
6. (a) State two items of hardware and one item of software used to create a local area network (LAN) with a number of computers. **[3]**

(c) When data is transmitted around a network it is possible that the data becomes corrupted.

Explain how parity checking can be used to detect such transmission errors. **[4]**

Oct/NOV 2010. P12(9691)
6. (a) State two items of hardware and one item of software used to create a local area network (LAN) with a number of computers. **[3]**

(c) When data is transmitted around a network it is possible that the data becomes corrupted.
Explain how parity checking can be used to detect such transmission errors.**[4]**

Oct/NOV 2010. P13(9691)
6. (a) State two items of hardware and one item of software used to create a local area network (LAN) with a number of computers. **[3]**

(c) When data is transmitted around a network it is possible that the data becomes corrupted.
Explain how check sums can be used to detect such transmission errors. **[4]**

Topic: 1.2.1 Data transmission

May/June 2011. P11/12(9691)

8   (a)   State two differences between a local area network (LAN) and a wide area network(WAN).   **[2]**

(b)   State what is meant by each of the following types of data transmission. Give anadvantage of each.
(i)   Serial
(ii)   Parallel   **[4]**

(c)   The following bytes were received during a data transmission.
01101101   10101010   10111101   10110001
Parity is being used as an error check.
State which one of the bytes has been corrupted. Explain why you chose the one that you did.   **[3]**

May/June 2011. P13(9691)

8.   (a)   State two differences between a local area network (LAN) and a wide area network(WAN).   **[2]**

(b)   (i)   State what is meant by data being transmitted serially using a simplex mode ofdata transmission.   **[2]**
(ii)   State what is meant by data being transmitted in parallel using a half-duplex mode of data transmission.   **[2]**

(c)   The following bytes were sent during a data transmission.
01101100   10101010   10110001
Explain how a check sum can be used to check whether or not the bytes have been corrupted during transmission.   **[3]**

Topic: 1.2.1 Data transmission

Oct/NOV 2011. P11(9691)

8   The computers in a school classroom are networked. It is decided that this network shouldbe linked to the Internet.

(a)   State two items of hardware and one type of software which would be necessary toconnect this network to the Internet.   **[3]**

(b)   When a video file is accessed on a network it can be watched as it is downloading or itcan be stored for watching at a later date.   **[4]**
Explain the relationship between the required bit rates and the data being transmitted.

(c)   When communications are required across a network a protocol is necessary.

(i)   Explain the need for a handshake as part of a protocol, giving examples of whatoccurs during a handshake.   **[3]**

(ii)   Explain why a protocol consists of a number of layers.   **[2]**

Oct/NOV 2011. P12(9691)

8   A building firm has a main office with stand-alone computers for the workers to use.
It is decided to link these stand-alone computers to make a network.

(a)   State two items of hardware and one type of software which would be necessary tocreate the network.   **[3]**

(b)   When data is passed around a network it can be corrupted.
Explain how check sums can be used to detect errors in transmitted data. **[4]**

Oct/NOV 2011. P13(9691)

8   A factory specialises in making components for cars.
The offices of the factory have a number of stand-alone computers. The decision is taken tolink these machines in a network.

(a)   (i)   State two items of hardware which would be necessary to network the computers.   **[2]**

(ii)   State one extra item of hardware which would be required if the network was to be linked to the Internet.   **[1]**

(b)   When data is transmitted around a network it can be corrupted.
Explain, giving examples, how parity can be used to detect errors in transmitted data.   **[4]**

May/June 2012. P11/12(9691)

8   (a)   The manager of a firm has been advised to link all the firm's computers to form a LocalArea Network (LAN).

(i)   Explain to the manager two benefits of connecting the computers in a LAN.

[2]

(ii)   One computer is connected to its own printer using parallel data transmission.
Explain what is meant by parallel data transmission.   **[2]**

Topic: 1.2.1 Data transmission

May/June 2012. P13(9691)

8 (a) A firm has offices in the three major cities in a country. The manager is advised that theLocal Area Networks (LANs) in each of the cities should be connected to provide aWide Area Network (WAN).

   (i) Explain to the manager what is meant by a WAN. **[2]**

   (ii) Communication across a LAN is by serial data transmission. Explain what is meant by serial data transmission. **[2]**

 (b) When data is transmitted it may become corrupted.

   (i) Explain how a parity check can be used to detect a possible error in a transmittedbyte. **[3]**

   (ii) Describe how parity can be used to identify and correct the single error in thistransmitted data block:

```
0 1 1 0 1 1 0 1
1 0 0 1 0 1 1 1
0 1 0 1 0 1 0 0
1 0 0 0 1 0 0 1
0 1 1 0 0 0 1 1
1 0 0 0 0 1 1 0
0 1 1 0 1 1 0 1
0 1 0 0 0 0 0 0 Parity byte
```
                                                                             [3]

Oct/NOV 2012. P11 (9691)

9 (a) Describe what is meant by the following types of data transmission:

   (i) serial, simplex transmission **[2]**

   (ii) parallel, full duplex transmission **[2]**

 (b) Define the term protocol. **[2]**

 (c) When data is transmitted between devices it can be corrupted. One method to detectcorruption is the use of parity.

   Explain how parity can be used to detect the presence of errors in a transmission.

                                                                             [4]

Oct/NOV 2012. P13(9691)

9 (a) Describe what is meant by the following types of data transmission:

   (i) serial, full duplex transmission **[2]**

   (ii) parallel, half duplex transmission **[2]**

 (b) Define the term protocol. **[2]**

 (c) When data is transmitted between devices it can be corrupted. One method to detectcorruption is the use of a checksum.

   Explain how a checksum can be used to detect the presence of errors in a transmission. **[4]**

Topic: 1.2.1 Data transmission

May/June 2013. P11/P12(9691)

3   **(a)**   Describe what is meant by:
                  (i)   serial, simplex transmission
                  (ii)   parallel, full duplex transmission   **[2]**

    (b)   The word C O M P U T I N G is to be transmitted as nine bytes of data. Each character in the word has an ASCII value.
The system uses even parity and the left most bit is added to make each byte evenparity.
        (i)   Complete the codes so that they all have even parity.

C	1	0	0	0	0	1	1
O	1	0	0	1	1	1	1
M	1	0	0	1	1	0	1
P	1	0	1	0	0	0	0
U	1	0	1	0	1	0	1
T	1	0	1	1	0	0	0
I	1	0	0	1	0	0	1
N	1	0	0	1	1	1	0
G	1	0	0	0	1	1	1

                                                        [2]

        (ii)   Fill in the parity byte in the final row in the table above. [1]
        (iii)   The character 'P' is received incorrectly as 0 1 0 1 1 0 0 0
Describe how horizontal and vertical parity checking would be used to detect theerroneous bit.   **[3]**

May/June 2015. P11 (2210)

1 (a) State what is meant by the terms:
Parallel data transmission
Serial data transmission   **[2]**
(b) Give **one** benefit of each type of data transmission.
Parallel data transmission
Serial data transmission   **[2]**
(c) Give **one** application of each type of data transmission. Each application must be different.
Parallel data transmission
Serial data transmission   **[2]**

2 (a) State what is meant by the term USB.   **[1]**
(b) Describe **two** benefits of using USB connections between a computer and a device. **[2]**

Topic: 1.2.1 Data transmission

May/June 2015. P12 (2210)

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

[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 percharacter). 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
Column number   **[2]**
(ii) Explain how you arrived at your answer for **part (b)(i)**.   **[2]**

Topic: 1.2.1 Data transmission

(c) Give the denary (base 10) value of the byte: **1 0 1 1 1 1 1 0**   **[1]**

(d) A parity check may not identify that a bit has been transmitted incorrectly.
Describe **one** situation in which this could occur.   **[1]**

Oct/ Nov 2015. P12 (2210)

5 A security system uses sensors, a camera and a microprocessor to capture images of each person entering a large shopping mall.

(c) The shopping mall has over 100 cameras. At the end of each day all these cameras send their images, captured over the last 24 hours, to a central computer.

Explain why the mall uses dedicated fibre optic cable rather than transmitting the data over the local broadband network.   **[2]**

May/June 2016. P11 (2210)

4 (a) Nikita wishes to print out some documents and connects her printer to the computer using one of the USB ports.

    (i) Identify what type of data transmission is being used.   **[1]**

    (ii) Give **three** reasons for using a USB port.   **[3]**

    (iii) The printer runs out of paper while it is printing the documents. A signal is sent to the processor to request that the problem is dealt with.
        Name this type of signal.   **[1]**

May/June 2016. P12 (2210)

6 (a) Three descriptions of data transmission are given below.
Tick (✓) the appropriate box in each table to show the:
- type of transmission
- method of transmission

Description 1:

Data is transmitted several bits at a time down several wires in both directions simultaneously.

Type	Tick (✓)
simplex	
half-duplex	
full-duplex	

Method	Tick (✓)
serial	
parallel	

Description 2:

Data is transmitted in one direction only, one bit at a time, down a single wire.

Type	Tick (✓)
simplex	
half-duplex	
full-duplex	

Method	Tick (✓)
serial	
parallel	

Description 3:

Data is transmitted one bit at a time down a single wire; the data is transmitted in both directions but not at the same time.

Type	Tick (✓)
simplex	
half-duplex	
full-duplex	

Method	Tick (✓)
serial	
parallel	

[6]

(b) Give **two** reasons why serial transmission, rather than parallel transmission, is used to connect devices to a computer. **[2]**

9 In the following barcode, each binary number is made up of seven bars.
Each bar is black or grey.
A black bar is interpreted as a "1" and a grey bar is interpreted as a "0".

(a) Write the binary numbers that would be produced from this barcode:

(b)

Binary number A   Binary number B

Binary number A: | | | | | | | |

Binary number B: | | | | | | | |

[2]

(b) This barcode system uses odd parity.
Write the parity bit for each of the binary numbers in **part (a)**:

Parity bit

Binary number A: [ ]

Binary number B: [ ]

[2]

Oct/Nov 2016 P12

3 (a) Explain what is meant by:
(i) Serial data transmission **[2]**
(ii) Parallel data transmission **[2]**
(b) A computer in a factory is connected to a printer. The printer is located in an office 1 km away from the factory.
Identify which data transmission method would be most suitable for this connection.
Give **two** reasons for your choice. **[3]**

4 Nine bytes of data are transmitted from one computer to another. Even parity is used. An additional parity byte is also sent.

Topic: 1.2.1 Data transmission

The ten bytes arrive at the destination computer as follows:

	parity bit	bit 2	bit 3	bit 4	bit 5	bit 6	bit 7	bit 8
byte 1	1	1	1	0	1	1	1	0
byte 2	0	0	0	0	0	1	0	1
byte 3	0	1	1	1	1	0	0	0
byte 4	1	1	0	0	0	0	0	0
byte 5	1	0	1	1	1	1	1	0
byte 6	0	1	0	1	1	0	0	1
byte 7	0	1	1	1	0	0	1	1
byte 8	0	0	1	1	0	1	1	0
byte 9	1	1	0	0	0	0	1	1
parity byte	0	0	1	0	0	0	1	0

One of the bits was corrupted during the data transmission.
(a) Circle the corrupt bit in the corrupt byte in the table above.   **[1]**
(b) Explain how the corrupted bit was found.   **[2]**

Zak
ZAFAR ALI KHAN

Topic: 1.2.1 Data transmission

Oct/Nov 2016 P13

3 Five computer terms and **seven** descriptions are shown below.
Draw a line to connect each computer term to its correct description.

Computer term	Description

Computer term

Serial, simplex data transmission

Parallel, half-duplex data transmission

Parity check

Automatic repeat request (ARQ)

Checksum

Description

Several bits of data sent down several wires, in both directions, but not at the same time

Several bits of data sent down several wires, in both directions, at the same time

An even or odd number of bits set to 1 in a byte, used to check if the byte has been transmitted correctly

One bit sent at a time, over a single wire in one direction only

An additional digit placed at the end of a number to check if the number has been entered correctly

A value transmitted at the end of a block of data; it is calculated using the other elements in the data stream and is used to check for transmission errors

An error detection method that uses response and time out when transmitting data; if a response is not sent back to the sender in an agreed amount of time, then the data is re-sent
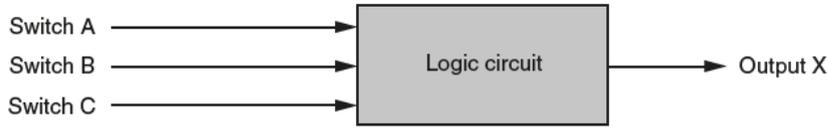
[5]

5 Three switches, A, B and C, each send values of 0 or 1 to a logic circuit. Value X is output from the logic circuit.

Output X has a value of 1 depending on the following conditions:

Switch A sends value 1 AND Switch B sends value 0

OR

Switch B sends value 1 AND Switch C sends value 0

(c) A microprocessor regularly samples the output, X. Each sample value is stored in an 8-bit register as shown below. One bit of this register is reserved as a parity bit.
Five consecutive output values of 1 indicate a fault condition.
Identify which of the following registers shows a fault condition.

[1]

(d) When eight bytes of data have been collected, they are transmitted to a computer 100 km away. Parity checks are carried out to identify if the data has been transmitted correctly. The system uses **even parity** and column 1 is the parity bit.
The eight bytes of data are sent together with a ninth parity byte:

	parity bit	column 2	column 3	column 4	column 5	column 6	column 7	column 8
byte 1	1	0	0	0	0	1	0	0
byte 2	1	1	1	1	0	0	1	1
byte 3	0	1	0	0	1	0	0	0
byte 4	0	1	1	1	0	0	0	1
byte 5	1	0	0	0	1	1	1	1
byte 6	0	0	0	0	0	0	0	0
byte 7	1	1	1	0	1	0	0	0
byte 8	1	0	0	0	1	1	1	0
parity byte	1	0	1	1	0	1	1	1

(i)   Identify which of the eight bytes contains an error.   **[1]**
(ii)   Identify which column contains an error.   **[1]**
(iii) The incorrect bit is indicated where the byte number and column cross.
           Give the corrected byte.   **[1]**
(iv)   Calculate the denary value of the corrected byte.   **[1]**
(v)   Considering the fault condition given in **part (c)**, explain why it is very important that the
           incorrect bit is located and corrected.   **[2]**

May/June 2017 P11(2210)

4 Five statements about **serial half-duplex** data transmission are shown in the table below.
Tick to show whether each statement is **true** or **false**.

Statement	true (✓)	false (✓)
Data is transmitted in one direction only, one bit at a time.		
Data is transmitted in both directions, multiple bits at a time.		
Data is transmitted in one direction only, multiple bits at a time.		
Data is transmitted in both directions, but only one direction at a time. Data is transmitted one bit at a time.		
Data is transmitted in both directions, but only one direction at a time. Data is transmitted multiple bits at a time.		

[5]

5 (a) Parity checks are often used to detect errors that may occur during data transmission.
The received bytes in the table below were transmitted using **odd parity**.

Tick to show whether each byte has been **corrupted during transmission** or **not
corrupted during transmission**.

Received byte	corrupted during transmission (✓)	not corrupted during transmission (✓)
10110100		
01101101		
10000001		

[3]

Topic: 1.2.1 Data transmission

(b) Another method of error detection is Automatic Repeat reQuest (ARQ).
Explain how ARQ is used in error detection.   **[4]**

May/June 2017 P12(2210)

7 Computer A is communicating with computer B.
(a) Draw an arrow or arrows to show simplex, duplex and half-duplex data transmission. The
direction of the data transmission must be fully **labelled**.

Simplex data transmission

Computer **A**   Computer **B**

Duplex data transmission

Computer **A**   Computer **B**

Half-duplex data transmission

Computer **A**   Computer **B**

[6]

(b) State a use for the following data transmission methods. The use must be different for each
data transmission method.   **[2]**

Topic: 1.2.1 Data transmission

Oct/Nov 2017 P12(2210)

4 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	

(ii) Explain why your answer to **part (a)(i)** is the most suitable data transmission. **[4]**

(b) Identify and describe **two** methods of error checking that can be used to make sure that the data stored after transmission is accurate. **[6]**

6 Selma writes the following **four** answers in her Computer Science examination.
State which computer terms she is describing.

"It is a signal. When the signal is received it tells the operating system that an event has occurred."
Selma is describing ....

"It takes source code written in a high level language and translates it into machine code. It translates the whole of the source code at once."
Selma is describing ....

"The part of the central processing unit (CPU) that carries out calculations."
Selma is describing ....

"When data is transmitted, if an error is detected in the data received a signal is sent to ask for the data to be retransmitted. This continues until the data received is correct."
Selma is describing ....

[4]

Topic: 1.2.1 Data transmission

May/June 2018 P11(2210)

3 The three binary numbers in the registers A, B and C have been transmitted from one computer to another.

	Parity bit							
Register A	1	0	0	1	1	0	0	0
Register B	0	1	1	0	0	1	1	1
Register C	1	0	0	1	1	0	0	1

One binary number has been transmitted incorrectly. This is identified through the use of a parity bit.
Identify which register contains the binary number that has been transmitted **incorrectly**. Explain the reason for your choice.   **[4]**

May/June 2018 P12(2210)

12 (a) Selma has some important personal information that she needs to email to her employer.
She wants to make sure that if the personal information is intercepted, it cannot be understood.
(i) State how Selma could email her personal data more securely.   **[1]**

(ii) Describe how your chosen solution works.   **[5]**

(b) Selma wants to make sure that the information received is correct.
A parity check can be used to detect errors.
Describe another error detection method that can be used to check the information received is correct.   **[3]**