AQA Level 3 Technical Level IT
Communication technologies

Unit **Number: H/507/6426**

Specimen Question Paper

Time allowed: **2 hours**

Instructions
- Use black ink or black ball-point pen
- Answer **all** questions
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages
- Do all rough work in this book. Cross through any work you do not want to be marked

Information
- There are two sections to this paper
- Both sections should be attempted
- Learners should spend approximately 60 minutes on Section A and 60 minutes on Section B
- There are 80 marks available on this paper
- The marks for the questions are shown in brackets

Advice
- Please read each question carefully before starting

Please write clearly, in block capitals, to allow character computer recognition.

Centre number ☐☐☐☐☐   Learner number ☐☐☐☐

Surname ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Forename(s) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Learner signature _____

SPECIMEN MATERIAL – COMMUNICATION TECHNOLOGIES

Section A

Answer **ALL** questions in this section

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0 1 Which of the following is **not** a network topology?
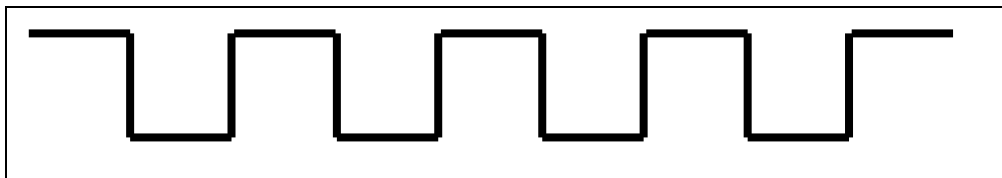
A Ring ◯

B Sieve ◯

C Bus ◯

D Line ◯

[1 mark]

0 2 State **one** main function of a DCE device:

[1 mark]

_____

_____

0 3 A transmission is found to have the following waveform:

State what type of signal this represents.

[1 mark]

_____

_____

0 4 The binary value 01010111 has been received by a device. It was transmitted using even parity.

Give **one** reason how you know this data has been corrupted during transmission.

[1 mark]

_____

_____

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0 5 Which transmission media is used in Bluetooth technology?

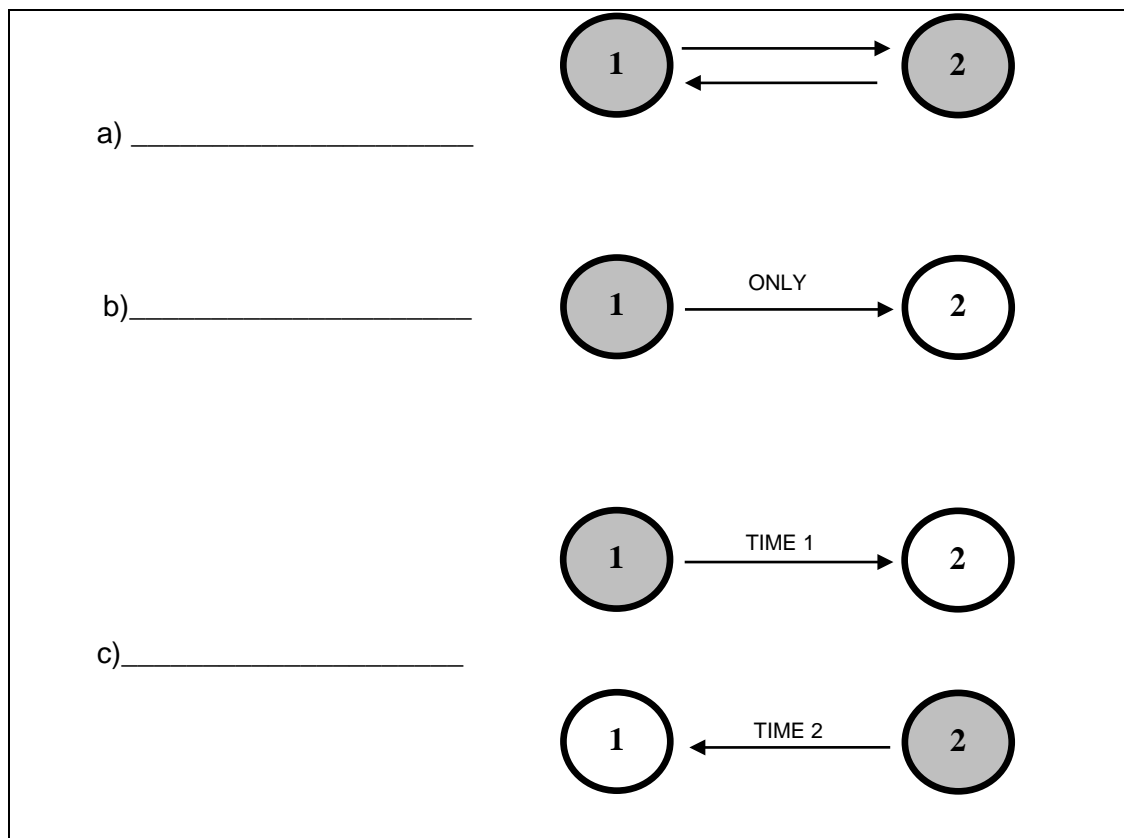A Ethernet cable   ⬭

B Infrared   ⬭

C Radio waves   ⬭

D Satellite microwaves   ⬭

[1 mark]

0 6 The following diagram shows three different types of data transmission. Complete the diagram by labelling each type, a), b) and c), correctly:

a) _____

b) _____

c) _____

.

[3 marks]

0 7 (a) State the difference between how a coaxial and an optical digital audio cable transfers an audio signal.

[1 mark]

Turn over ▶

(b)   Explain why a coaxial cable is more susceptible than an optical cable to environmental noise.

[2 marks]

| 0 | 8 |

State **three** technologies you could use to connect a laptop wirelessly to the Internet in a public place.

[3 marks]

| 0 | 9 |

A technician wants to connect a PC to a router using a serial cable. They are told to use the following protocol to connect the two devices.

The letter 'N' represents 'no parity bit'. What does each of the three numbers represent?

> **9,600   8   N   1**

a) 9,600   ………………………………………………….…………………

b) 8   ………………………………………………..…………………………

c) 1   …………………………………………..…………………………
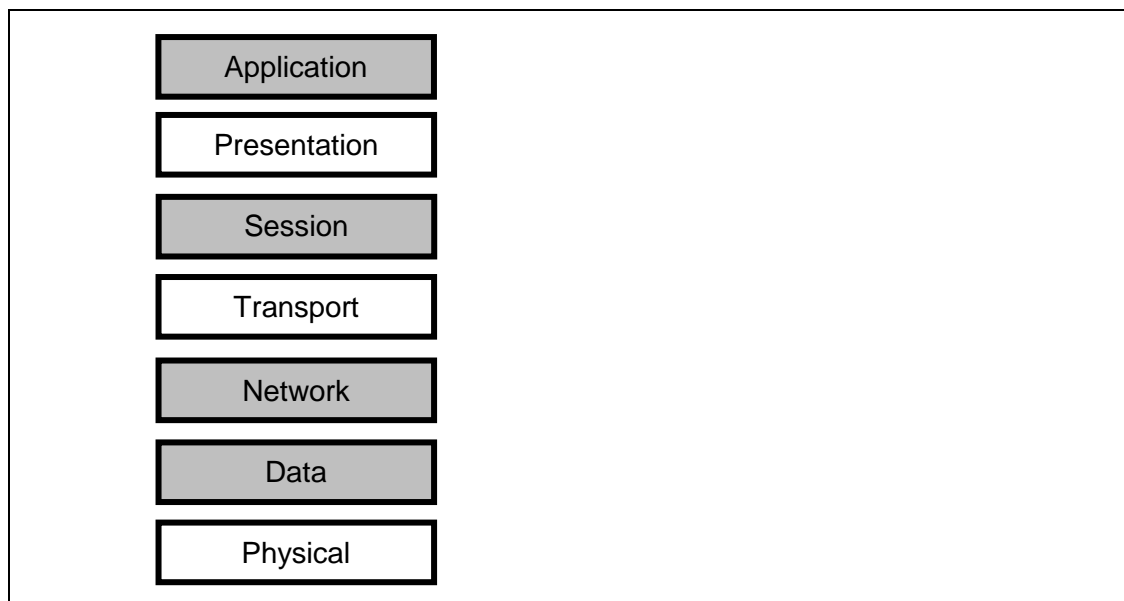
[3 marks]

| 1 | 0 |

A company has installed a Gigabit (1,000Mbps) Ethernet router to speed up their network. Testing shows that the network is still only carrying traffic at 80Mbps.

State **three** reasons that might cause the network to be slower than expected

[3 marks]

| 1 | 1 |

State **three** functions of the presentation layer in the OSI model of computer networking.

[3 marks]

1 2

a) Describe **one** difference between how an application server and a web server handle protocols.
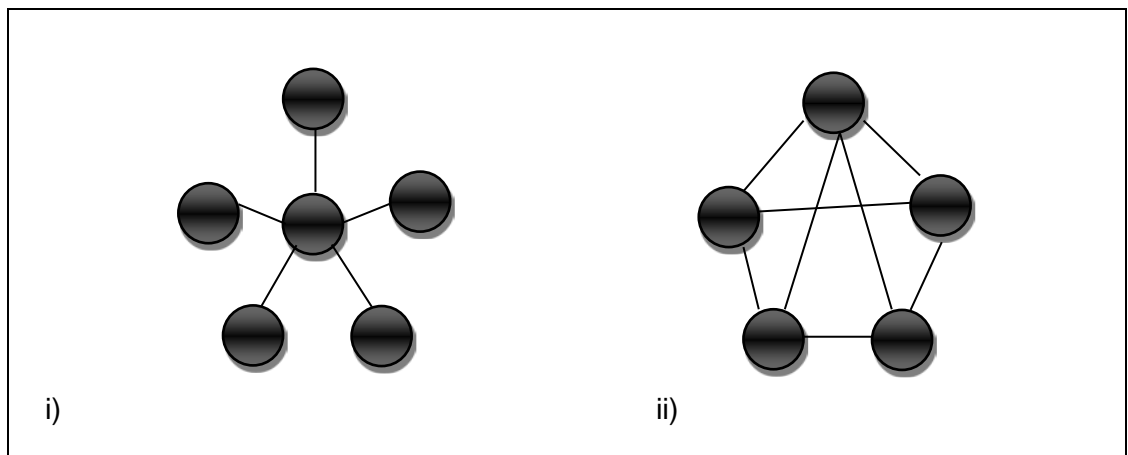
[2 marks]

b) State **one** benefit of running software on an application server rather than a client machine.

[1 mark]

1 3

The following diagrams show the topologies of two different networks.

i)   ii)

a) State **one** appropriate technical term for each topology.

[2 marks]

b) State **two advantages** and **two disadvantages** for the arrangement of the network in each case.

[4 marks]

| 1 | 4 |

Explain **three different types** of data that could be acquired from a SIM card to identify a mobile phone user's identity and behaviour.

[6 marks]

1 5 You have been asked to recommend a way to connect a home office to the Internet. Compare the use of guided or unguided transmission media as possible solutions.

You should consider in your answer:
- Ease of installation
- Operational effectiveness and range

[6 marks]

1 6   a) Identify **two** different uses of HD quality video.

[2 marks]

b) Compare and contrast the effectiveness of 3G and 4G technologies for distributing HD quality video.

[4 marks]

Section B

Answer **ALL** question(s) in this section

Read Item A and answer the questions on the following page:

Item A

Bandwidth (the amount of data that can be transmitted) is shared between everybody who is connected to the ISP's network, including businesses and home users. From the consumer perspective, the need for speed is greater than ever: 4G mobile phones, fibre optic broadband and cable speeds in cities now exceed 152Mbps. Yet in rural areas, limited by old technology in telephone exchanges, sparse populations and limited business infrastructure, the problem is different: due to low demand there is little capacity for the investment needed to expand.

The demand for data rises sharply every year because we are addicted to our Internet connected devices. ISPs are under pressure to provide a reliable, high-speed service at an affordable price. Some ISPs use traffic management to throttle connections at peak times. This is something consumers don't like, especially as ISPs bury this information in the small print.

The ISP has to strike a balance in their network allocation between making a profit and having so many users online at once that the connection slows to a trickle – which could mean losing hard-won customers. Some ISPs now guarantee a higher throughput – at a price. Customers who are prepared to pay extra can guarantee the speed of their connection at peak times.

When the network is busy, it's easy for things to get out of control. Some ISPs limit the amount of bandwidth used by protocols such as bit torrent to download files from the Internet – often large files, such as HD movies and commercial software. These users can quickly spoil the experience for other customers. Streaming services such as iPlayer, SkyGo and YouTube add a lot of traffic to the network. This costs the ISPs money.

The infrastructure between the telephone exchange and the ISP is called a 'backhaul connection'. It is similar to a large pipe that the smaller pipes flow into, relieving pressure on the network between the customer's house and the ISP. The most common sizes are 155Mbps and 622Mbps. It has to be bought or rented from a wholesale provider like BT and is hugely expensive. This is why an ISP provides packages with limits – such as capping – and "up to" speed packages. A 100Mbps backhaul might serve thousands of customers (or 'tails') but only if the network is managed effectively.

| 1 | 7 |

You are working as a Network Consultant for an ISP. Two customers have complained about the unreliable speed of their internet connection and are not happy with the response.

You have been asked to investigate and respond to the customers.

Item B

	Rural customer	**Urban customer**
Package	2Mbps broadband	8Mbps broadband
Capping	10GB monthly	Unlimited downloads
Throttling	At peak times	Bit torrent, peer-to-peer
Fibre available	No	Yes
Locality	Small village, 1,000 people	Manchester City Centre
Usage	iPlayer, Internet, email	Downloading software, movies

Using all the information in Items A and B:

(a)   Suggest **two** ways in which rural and urban customers could alter their package or change their usage to improve their experience.

[4 marks]

(b) Justify, from an ISP perspective, how bandwidth has been allocated on your network.

[8 marks]

(c)   Outline the relationship between a local area network, a wide area network and an Internet Service Provider (ISP).

[3 marks]

_____

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| 1 | 8 |

An international law firm has proposed a new system that would allow them to communicate directly with partners across the world on a 24/7 basis, to "enable the flow of funds and information between corporate headquarters and operating units in different countries".

As well as being able to access documents for both current project management and historical cases, the system would allow client companies to sign legally binding US and EU contracts from their inbox. It will also allow legal partners to attend meetings from the other side of the world as if they were actually there.

(a)   State **one** way the law firm could identify one of their partner firm's desktop computers on a network.

[1 mark]

_____

_____

_____

_____

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(b)   Identify **three** remote working tools that could be used by the law firm and provide a benefit/advantage of how each of these remote working tools will help the client companies achieve the goals outlined in the question.

[6 marks]

(c)   Outline the commercial risks faced from using the new system and explain the
steps that could be taken to minimise them.

[8 marks]

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ANSWER IN THE SPACES PROVIDED