Surname	Centre Number	Candidate Number
First name(s)		2

GCE A LEVEL – NEW

S24-1540U30-1

1540U30-1

THURSDAY, 13 JUNE 2024 – MORNING

DIGITAL TECHNOLOGY – A2 unit 3
Connected Systems

Paper version of on-screen assessment

2 hours 30 minutes

1540U301
01

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

Examiner only

Answer **all** questions.

1. Describe, using suitable examples, passive and active data collection and their advantages and disadvantages. [6]

Examiner only

2. A large media-streaming company allows its users to search for content and play related videos online.

(a) (i) Describe **two** compression methods used to store video files. [6]

Examiner only

(ii) A video stored on the company's server requires approximately 5 MB of storage for each uncompressed frame. The video was recorded at a frame rate of 60 fps and is 120 seconds long.

Uncompressed sound and meta data in the video file require an additional 20 MB storage.

Calculate the total storage size of this video file in gigabytes.

Show all your workings. [5]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Examiner only

(b) Describe the importance of monitoring data usage and size on Content Delivery Networks (CDNs). [6]

Examiner only

3. (a) Describe the uses of cloud storage technology. [6]

(b) Evaluate the benefits of blockchain storage over centralised systems, such as cloud storage. [5]

Examiner only

4. A supermarket sells a range of food and non-food products, including fresh and frozen food, drinks, bakery, home and entertainment products, and electrical goods.

(a) Consider how descriptive data analytics can provide useful information for the supermarket's management team. [8]

Examiner only

(b) Explain how the supermarket's management team can use data visualisation. [6]

Examiner only

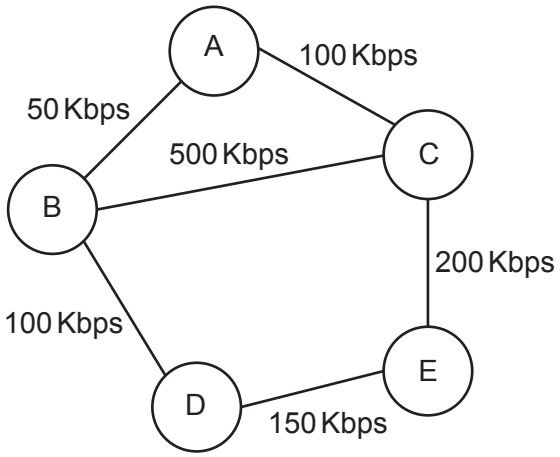
(c) The supermarket is considering selling its goods online and is concerned about the cyber security implications.

Describe the following resilience controls that may be used to prevent a cyber-attack:

- boundary firewall
- internet gateway
- access control
- malware protection. [8]

Examiner only

5. (a) The transmission speeds between the nodes of a network have the values shown in the diagram below.



A cost for routing data packets between nodes is calculated by dividing 1 Mbps by the transmission speed of the link. For example:

$$\text{Cost for the link A to B} = \frac{1\,\text{Mbps}}{50\,\text{Kbps}} = \frac{1\,000\,000}{50\,000} = 20$$

Packets are transmitted between source and destination by the route that has the lowest total cost.

(i) Calculate the costs for each of the remaining 5 links in the network. [2]

.....

.....

.....

.....

.....

Examiner only

(ii) Complete the table to show the lowest cost routes that would be taken by packets from node A to each of the other nodes B to E.

You may assume that the traversal of a node costs 0. [4]

Destination node	Route, listing intermediate nodes	Total cost
B		
C		
D		
E		

(b) Describe the role and facilities provided by:

(i) network resource and applications management. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Examiner only

(ii) network activity management. [4]

Examiner only

6. A friend is considering using a new Internet Service Provider (ISP).

Advise them on the factors they should consider when selecting an ISP. [8]

Examiner only

7. Compare the suitability of symmetric and asymmetric encryption when sending confidential files over the internet. [6]

Examiner only

8. Cryptocurrencies can be used for transactions and storage of funds.

Consider the cyber security risks associated with cryptocurrencies. [6]

Examiner only

9. Mobile technologies refer to a wide range of technologies that are designed to be used on mobile devices, such as smartphones and tablets.

Outline the developments in transmitting data over mobile technologies since 2G. [10]

Examiner only

Examiner only

END OF PAPER

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only