



Rewarding Learning

**ADVANCED**  
General Certificate of Education  
2024

Centre Number

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Candidate Number

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# Digital Technology

Assessment Unit A2 1

*assessing*

Information Systems



**[ADT11]**

\*ADT11\*

**FRIDAY 14 JUNE, AFTERNOON**

### TIME

2 hours 30 minutes.

### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write outside the boxed area on each page or on blank pages.**

**You are not permitted to use any calculating aid in this paper.**

Complete in black ink only. **Do not write with a gel pen.**

Answer **all six** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 150.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Questions **1(d)**, **2(d)** and **4(c)(ii)**.



- 1 (a) Complete the following table. You should only use each network and communication medium once.

Network user	Network	Communication medium
University campuses spread over a city		
International supermarket chain		
School office		

[6]

- (b) Explain the purpose of each of the following network resources.

Repeater

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Wireless access point

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Media converter

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[9]

(c) Complete the following statements about network resources.

Each device on the Internet is assigned a unique

\_\_\_\_\_ to distinguish the device

from \_\_\_\_\_.

A \_\_\_\_\_ is coded onto a

\_\_\_\_\_

during manufacture.

[4]

[Turn over



(d) Evaluate a star network and a bus network with respect to the impact of adding a new node.

**Quality of written communication will be assessed in this question.**

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[6]

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**[Turn over**



\*28ADT1105\*

**2 (a)** Identify the four layers in the Transport Set of the OSI model.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_ [4]

**(b)** Describe the main features of each of the following communication protocols.

Bluetooth

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Wi-Fi

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[6]



(c) Distinguish between the terms bandwidth and broadband.

Bandwidth

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Broadband

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[4]







(e) When the byte  $10011010_2$  is transmitted, the most significant bit and the least significant bit both flip.

(i) Show the byte after it has been transmitted.

\_\_\_\_\_ [1]

(ii) Explain what will happen if echo checking is used.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

(iii) Explain what will happen if a parity bit is used.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [4]

[Turn over



3 (a) Complete the following table which describes the three stages in data normalisation.

Stage	Description
In 1NF	Each record has a _____ key There are no _____ groups of _____
In 2NF	There are no _____ dependencies
In 3NF	There are no _____ dependencies

[5]



(b) Explain the meaning of each of the following database terms.

Composite key

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Referential integrity

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[6]



An employer provides training courses for employees. Details about these courses are contained in a table with the following headings.

Employee ID	Employee Name	Employee Email	Course ID	Course Title	Completion Date	Tutor ID	Tutor Name
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A course is taught by a single tutor.

A tutor can teach on a number of courses.

An employee can take a number of courses.

**(c)** Normalise the table to 3NF showing all your work.

1NF

[2]

2NF

[3]



3NF

[3]

(d) Draw a fully labelled entity-relationship diagram, which does not contain any many-to-many relationships, for this system.

[5]

[Turn over

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(e) Describe the change which is required to your diagram in part (d) if a course can be taught by more than one tutor. Do not redraw the diagram.

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[2]





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**[Turn over**



\*28ADT1115\*

- 4 (a) A library uses a relational database. Two entities in the database are shown below.

**AUTHOR (AuthorID, Name, ContactNumber)**

**BOOK (BookID, Title, Format)**

- (i) Produce SQL code to add the following author to the database.

<b>AuthorID</b>	<b>A1493</b>
<b>Name</b>	<b>Diggy Tech</b>
<b>ContactNumber</b>	<b>12345</b>

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[4]

- (ii) Produce SQL code to retrieve the BookID and Title of all books in Hardcopy format.

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[4]







**(iii)** Describe how a query to retrieve the BookID and Title of all Hardcopy books would be created using Query By Example (QBE).

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**[4]**

**(b)** Describe the main features of neural network modelling.

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**[6]**

**[Turn over**



(c) An expert system is used to provide life insurance quotations.

(i) Describe the role of insurance consultants during the development of this system.

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[6]





- 5 (a) Explain the difference between a natural language processing system and a voice recognition system.

Natural language processing system

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Voice recognition system

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[4]

- (b) Explain how each of the following supports mobile phone communication.

A cell

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A base station controller

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[6]

(c) Discuss how the use of data mining could threaten the privacy of supermarket customers.

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[4]

[Turn over



(d) Explain each of the following terms used in cloud computing.

Clustering

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Hosted solution

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[6]





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**[Turn over**



\*28ADT1123\*

6 (a) Data Protection legislation sets out how personal data must be collected, processed and stored.

(i) Explain the following terms relating to Data Protection legislation.

Data subject

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Data controller

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[4]





(ii) Data Protection legislation states that personal data should be collected for a specified purpose.

Identify four other principles of Data Protection legislation.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

[4]



**(b)** Under the Computer Misuse Act, '*unauthorised access to computer material*' is an offence.

**(i)** State the two other crimes identified in the Computer Misuse Act.

1. \_\_\_\_\_  
\_\_\_\_\_
  2. \_\_\_\_\_  
\_\_\_\_\_
- [2]

**(ii)** Describe three steps an organisation should take to ensure employees comply with the Computer Misuse Act.

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- [6]



(c) Organisations should consider ethical issues in relation to digital technology.

Describe how an organisation should consider each of the following ethical issues.

1. Automated decision making \_\_\_\_\_

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2. Monitoring personal behaviour \_\_\_\_\_

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[6]

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<b>For Examiner's use only</b>	
<b>Question Number</b>	<b>Marks</b>
1	
2	
3	
4	
5	
6	

<b>Total Marks</b>	
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**Examiner Number**

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