



Rewarding Learning

ADVANCED
General Certificate of Education
2023

Centre Number

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Candidate Number

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Digital Technology

Assessment Unit A2 1

assessing

Information Systems



[ADT11]

ADT11

MONDAY 12 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)(ii)**, **3(b)(ii)** and **5(b)(iii)**.

13806



28ADT1101

1 Computers on a network can share resources.

(a) One resource which can be shared is hardware.

Identify two other resources which can be shared.

1. _____
2. _____ [2]

(b) One type of network is a local area network (LAN).

Complete the following table. The first line has been completed for you.

You should not use the same answer more than once.

Network	Scope	Communication Technology
LAN	Single building	Ethernet cable
MAN		
WAN		

[4]



(c) Describe how each of the following resources is used in a network.

Switched hub

Wireless access point

Media converter

[9]

[Turn over



(d) Bus, ring and star are types of network topology.

(i) Describe the main features of a bus network.

[4]



2 (a) Complete the following statement about a communication protocol.

A communication protocol is a set of _____ that enable devices on computer networks using different _____ to _____.

[3]

(b) The layers of the Open Systems Interconnection (OSI) model are arranged in two sets. One of these is called the Application Set.

(i) List the three layers in the Application Set.

1. _____

2. _____

3. _____

[3]

(ii) Name the other set in the OSI model.

[1]

(iii) Describe the purpose of each of the following layers.

Transport layer



(c) Describe the main features of the following communication protocols.

Ethernet

Voice over Internet Protocol (VoIP)

[8]





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28ADT1109

3 (a) Explain each of the following terms.

Bandwidth

Broadband

[4]



(b) Data can be transmitted over a network using metal cable and wireless.

(i) Name one other transmission medium and describe how data is transferred using this medium.

Name

Description

[5]



(ii) Evaluate metal cable and wireless with regard to data security.

Quality of written communication will be assessed in this question.

[6]

(c) The byte 10101010_2 is transmitted over a network. Due to an error, the byte is received as 11101010_2 .

(i) Explain how errors such as this will be detected if a parity bit is used.

[3]





(ii) Describe how errors are detected and corrected using a cyclic redundancy check (CRC).

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[6]

[Turn over

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28ADT1113

4 (a) Define each of the following database terms.

Data duplication

Referential integrity

[4]

A college stores data about students in a database.
Some data from this database is shown in the table below.

Student ID	Student Name	Address	DOB	Overall Grade	Module ID	Module Name	Tutor ID	Tutor Name	Mark
S300	Green	Belfast	02/03/2005	Merit	M101	Maths	T10	White	76
					M102	English	T11	Black	45
S301	Gray	Omagh	08/04/2005	Pass	M102	English	T12	Brown	68
S302	Green	Lisburn	03/05/2005	Merit	M102	English	T11	Black	82
					M101	Maths	T14	Grey	76
					M103	Art	T10	White	42

- Each student is enrolled on a course consisting of one or more modules.
- Each student is assigned a particular tutor for each module.
- A tutor can teach on more than one module.

Students are awarded a mark in each of their modules, and an overall grade for their course.



(b) Explain why the data in this table is not in first normal form (1NF).

[2]

(c) Normalise the data in the table to 1NF.

[2]

(d) Normalise the data in the table to second normal form (2NF).

[3]

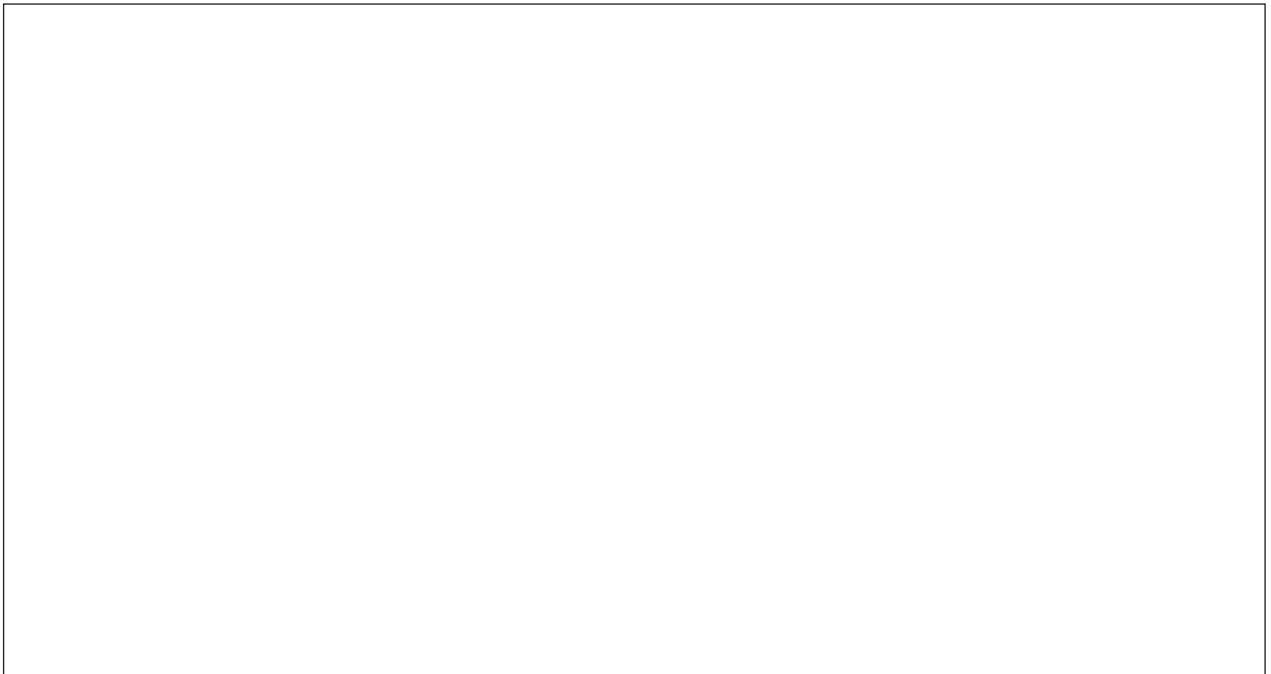
[Turn over



(e) Normalise the data in the table to third normal form (3NF).

[4]

(f) Produce an entity relationship (ER) model for the data in the table above. This should not contain any many-to-many relationships.



[7]





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28ADT1117

5 (a) A programmer is using Structured Query Language (SQL).

(i) Describe the purpose of the following SQL code.

```
CREATE TABLE Contacts (  
    ContactName varchar(255),  
    Email varchar(50),  
    Tele varchar(15)  
);
```

[4]

(ii) Describe the effect of the following SQL code.

```
INSERT INTO Contacts  
VALUES ('Green', 'Green@seequell.co.uk', '01234567');
```

[2]



(iii) Describe the effect of the following SQL code.

```
INSERT INTO Contacts  
VALUES ('Green', 'Green@seequell.co.uk');
```

[2]

(iv) Describe the purpose of the following SQL code.

```
SELECT ContactName, Email FROM Contacts  
WHERE ContactName = 'Green';
```

[2]



(b) One of the components of an expert system is the knowledge base.

(i) State the two other components of an expert system.

1. _____
2. _____ [2]

(ii) Explain the difference between factual knowledge and heuristic knowledge.

 [4]

(iii) Expert systems are used in medicine.

Evaluate the use of expert systems in diagnosing illnesses.

Quality of written communication will be assessed in this question.

[6]



(c) A voice recognition system can decode spoken commands using pattern matching.

(i) Explain what is meant by pattern matching.

[4]

(ii) Identify two other ways in which voice recognition can be achieved.

1. _____

2. _____ [2]





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28ADT1123

6 (a) More and more businesses are using cloud computing.

(i) Explain the following cloud computing terms.

Hosted instance _____

Clustering _____

_____ [4]

(ii) Describe how cloud computing can provide each of the following services.

Data storage





Remotely hosted applications

[8]

13806

[Turn over



28ADT1125

(b) Businesses which use digital technology should comply with all relevant legislation.

(i) Describe the main features of the Computer Misuse Act.

[6]



(ii) Explain the impact of Data Protection legislation on members of the public.

[6]

THIS IS THE END OF THE QUESTION PAPER



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Question Number	Marks
1	
2	
3	
4	
5	
6	
Total Marks	

Examiner Number

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28ADT1128