



Rewarding Learning

ADVANCED
General Certificate of Education
2022

Centre Number

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Candidate Number

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Digital Technology

Assessment Unit A2 1

assessing

Information Systems

MV24

[ADT11]

MONDAY 13 JUNE, AFTERNOON

Time

2 hours 30 minutes, plus your additional time allowance.

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 on blank pages.

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

Complete in black ink only.

Answer **all six** questions.

Information for Candidates

The total mark for this paper is 150.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Questions **1(d)**, **2(f)**, **3(h)**, **4(e)** and **5(d)**.

1 (a) Distinguish between each of the following types of network. [6 marks]

LAN

MAN

WAN

(b) Complete the following table by filling in the name of the most appropriate network resource. [6 marks]

Network resource	Description
	Acts as a single connection point on a network
	Regenerates distorted digital signals
	Connects a fibre optic cable and a copper cable
	Embedded in a NIC
	Manages network resources
	Connects a Wi-Fi enabled device to a network

(c) Describe the main features of each of the following. [6 marks]

Server-based network

Peer-to-peer network

2 The International Telecommunications Union (ITU) is an agency of the United Nations.

(a) Identify three main responsibilities of the ITU. [3 marks]

1. _____

2. _____

3. _____

(b) Explain the purpose of a communications protocol. [2 marks]

The Open Systems Interconnection (OSI) model provides a framework for data transfer between networks. It consists of seven layers.

(c) Fill in the five blanks in the following table. [5 marks]

Layer	Set
Application	Application Set
1.	
Session	
2.	5. _____ Set
3.	
Data Link	
4.	

(d) Describe the purpose of each of the following OSI layers. [6 marks]

Application

Data Link

3 An online retailer stores data about orders in a database.

A simplified extract from the database is shown opposite.

(a) Explain why the data in this table is not in first normal form (1NF). [2 marks]

OrderID	OrderDate	CustID	CustName	CustAddress	ProdID	ProdName	Size	Cost	Quantity
56	20/05/21	45	Green	Belfast	89	Table	Large	£200	2
					45	Table	Small	£100	4
					32	Desk	Small	£150	1
57	23/05/21	81	Blue	Omagh	45	Table	Small	£100	3
					89	Table	Large	£200	1
					12	Desk	Large	£300	2
58	30/05/21	45	Green	Belfast	89	Table	Large	£200	5
					23	Cabinet	Small	£150	6

The data in the table is normalised to 1NF as follows.

ORDER

(OrderID, OrderDate, CustID, CustName, CustAddress)

ORDER-PRODUCT

(OrderID ProdID, ProdName, Size, Cost, Quantity)

(b) By referring to this data, explain each of the following. [4 marks]

Primary key

Composite key

(c) Explain why the data in the table is not in second normal form (2NF). [2 marks]

The data in the table is normalised to 2NF as follows.

ORDER

(OrderID, OrderDate, CustID, CustName, CustAddress)

ORDER-PRODUCT

(OrderID ProdID, Quantity)

PRODUCT

(ProdID, ProdName, Size, Cost)

(d) Explain why this data is not in third normal form (3NF). [2 marks]

(e) Normalise the data to 3NF. You need only show the entities which have changed from 2NF. [2 marks]

(f) By referring to the data in 3NF, explain what is meant by a foreign key. [2 marks]

(g) Produce an entity-relationship (ER) model for the retailer's database. It should not include any many-to-many relationships. [4 marks]

4 The famous mathematician Alan Turing proposed the Turing Test as one way of identifying Artificial Intelligence.

(a) State the purpose of the Turing Test.
[2 marks]

(b) Explain how the Turing Test is carried out. [4 marks]

A life insurance company uses an expert system when calculating insurance premiums.

(c) Explain what is meant by each of the following expert system terms.
[9 marks]

Shell

Fuzzy logic

5 Natural language processing is an important application of digital technology.

(a) Explain the purpose of natural language processing. [3 marks]

(b) Describe two uses of natural language processing. [4 marks]

1. _____

2. _____

Robotics plays an important part in space exploration.

(c) Explain the term robotics. [4 marks]

6 Data mining and big data are becoming more important to the retail sector.

(a) Explain what is meant by data mining.
[4 marks]

(b) Describe two ways in which the retail sector uses big data. [4 marks]

1. _____

2. _____

(c) Discuss how the use of data mining could threaten the privacy of individual shoppers. [4 marks]

Many organisations make extensive use of cloud computing and automated decision making.

(d) Explain what is meant by cloud computing. [4 marks]

(e) Explain each of the following terms.
[4 marks]

Virtualisation

Hosted instance

(f) Describe the main ethical problems which could arise from automated decision making. [4 marks]

**This is the end of the
question paper**

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	

Total Marks	
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Examiner Number

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